HP FlexFabric 11900 Switch Series

FCoE

Command Reference

Contents

FCoE commands

The switch supports FCoE only when operating in advanced mode. For more information about system operating modes, see *Fundamentals Configuration Guide*.

FCoE mode commands

display fcoe-mode

Use **display fcoe-mode** to display the FCoE mode of a switch.

Syntax

display fcoe-mode

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Examples

Display the FCoE mode of the switch.

```
<Sysname> display fcoe-mode
The FCoE mode is FCF.
<Sysname> display fcoe-mode
The FCoE mode is NPV.
<Sysname> display fcoe-mode
The FCoE mode is TRANSIT.
<Sysname> display fcoe-mode
The FCoE mode is NONE.
```

Related commands

fcoe-mode

fcoe-mode

Use **fcoe-mode** to configure an FCoE mode for the switch.

Use **undo fcoe-mode** to restore the default.

Syntax

fcoe-mode { **fcf** | **npv** | **transit** }

undo fcoe-mode

Default

A switch operates in non-FCoE mode.

Views

System view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

fcf: Configures the switch to operate in FCF mode.

npv: Configures the switch to operate in NPV mode.

transit: Configures the switch to operate in Transit mode.

Usage guidelines

The switch supports the following FCoE modes:

- **FCF mode**—A switch operating in this mode is called an FCF switch. Its VFC interfaces support E mode (E_Port) and F mode (F_Port).
- **NPV mode**—A switch operating in this mode is called an NPV switch. Its VFC interfaces support F mode (F_Port) and NP mode (NP_Port).
- **Transit mode**—A switch operating in this mode is called a Transit switch. Its Ethernet interfaces can operate in ENode mode or FCF mode.

An FCoE-capable switch can operate in the following modes:

- **FCF mode**—When the switch operates in this mode, it can connect to the E_Port on another FCF switch through its E_Port, or connect to the N_Port on a node or the NP_Port on an NPV switch through its F_Port.
- **NPV mode**—When the switch operates in this mode, it can connect to the N_Port on a node through its F_Port or to the F_Port on an FCF switch through its NP_Port.
- **Transit mode**—When the switch operates in this mode, it can restrict its Ethernet interface to receiving traffic only from an ENode or FCF switch by configuring the interface to operate in ENode mode or FCF mode.
- **Non-FCoE mode**—When the switch operates in this mode, it is a standard switch and does not provide any FCoE capabilities.

The switch can only convert from non-FCoE mode to one FCoE mode, or vice versa. It cannot convert directly among the three FCoE modes. To convert among the three FCoE modes, first convert the switch to non-FCoE mode. After converting the switch to non-FCoE mode, FCoE-related configurations in the original FCoE mode are cleared.

Examples

Configure the switch to operate in FCF mode.

```
<Sysname> system-view
[Sysname] fcoe-mode fcf
```

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Convert the switch operating in FCF mode to NPV mode.

```
[Sysname] undo fcoe-mode
All current FC configuration will be lost. Continue? [Y/N]:y
[Sysname] fcoe-mode npv
```

Related commands

display fcoe-mode

VFC interface and FIP commands

bandwidth

Use **bandwidth** to configure the expected bandwidth of an interface.

Use **undo bandwidth** to restore the default.

Syntax

bandwidth *bandwidth-value*

undo bandwidth

Default

The expected bandwidth (in kbps) is the interface baud rate divided by 1000.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

bandwidth-value: Specifies the expected bandwidth in the range of 1 to 400000000 kbps.

Usage guidelines

The expected bandwidth of a VFC interface affects routing by affecting the link costs in FSPF. By default, a VFC interface uses 10 Gbps for link cost calculation in FSPF.

Examples

Set the expected bandwidth of VFC interface 1 to 50 kbps.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] bandwidth 50
```

bind interface

Use **bind interface** to bind a VFC interface to an Ethernet interface.

Use **undo bind interface** to remove the binding.

Syntax

bind interface *interface-type interface-number* [**mac** *mac-address*]

undo bind interface

Default

A VFC interface is not bound to any Ethernet interface.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

interface-type interface-number: Specifies an interface by its type and number. This interface can only be a Layer 2 Ethernet interface or Layer 2 aggregate interface.

mac *mac-address*: Specifies the bound peer FCoE MAC address, in the format of XXXX-XXXX-XXXX and six bytes in length.

Usage guidelines

To make a VFC interface work, bind it to a physical Ethernet interface. The VFC interface sends and receives packets through the Ethernet interface bound to it.

To use one physical link to carry multiple VFC interfaces, you must bind these VFC interfaces to different peer FCoE MAC addresses, but you can bind them to one Ethernet interface. The FCoE MAC address identifies the device that communicates with a VFC interface. For a point-to-multipoint network, the FCoE MAC address must be bound. For a point-to-point network, the FCoE MAC address may not be bound.

You can use the **display fcoe** command to display the FCoE MAC address of a switch. You can display the FCoE MAC address of an ENode through some software or the NMS.

A VFC interface can be bound to only one Ethernet interface and to only one FCoE MAC address.

An Ethernet interface can be bound to multiple VFC interfaces, but an FCoE MAC address can be bound to only one VFC interface.

The Layer 2 Ethernet interface to be bound must be FCoE capable, or the binding will fail. All member ports of a Layer 2 aggregate interface to be bound must be FCoE capable, or the binding will fail. Also make sure new member ports of a bound Layer 2 aggregate interface are FCoE capable.

If you bind one VFC interface to a Layer 2 aggregate interface and another VFC interface to a Layer 2 Ethernet interface that is a member port of the Layer 2 aggregate interface, the binding to the Layer 2 aggregate interface does not take effect.

Examples

Bind interface VFC 4 to interface Ten-GigabitEthernet 1/0/1 and FCoE MAC address 000c-2999-eacd.

```
<Sysname> system-view
[Sysname] interface vfc 4
[sysname-Vfc4] bind interface ten-gigabitethernet 1/0/1 mac 000c-2999-eacd
```

Related commands

- **display fcoe**
- **display interface vfc**

default

Use **default** to restore the default settings for a VFC interface.

Syntax

default

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

> △ CAUTION:
>
> The **default** command might interrupt ongoing network services. Make sure you are fully aware of the impacts of this command when you execute it on a live network.

This command might fail to restore the default settings for some commands for reasons such as command dependencies or system restrictions. Use the **display this** command in interface view to identify these commands. Then use their **undo** forms or follow the command reference to individually restore their default settings. If your restoration attempt still fails, follow the error message instructions to resolve the problem.

Examples

\# Restore the default settings for interface VFC 1.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] default
This command will restore the default settings. Continue? [Y/N]:y
```

description

Use **description** to configure a description for a VFC interface.

Use **undo description** to restore the default.

Syntax

description *text*

undo description

Default

The description of an interface is *Interface name* Interface, for example, Vfc 1 Interface.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

text: Specifies an interface description, a case-sensitive string of 1 to 255 characters.

Usage guidelines

The description helps users identify the role of an interface.

Examples

Configure the description as **Vfcport1** for interface VFC 1.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] description Vfcport1
```

Related commands

display interface vfc

display fcoe

Use **display fcoe** to display FCoE global configuration.

Syntax

display fcoe

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Examples

Display FCoE global configuration.

```
<Sysname> display fcoe
  FCoE MAC   : 0000-1234-0202
  FC-MAP     : 0efc25
  FCF Priority: 128
  FKA period  : 8 seconds
```

Table 1 Command output

Field	Description
FCoE MAC	FCoE MAC address of the switch.
FC-MAP	FC-MAP value.
FCF Priority	System FCF priority.
FKA period	Interval at which a VFC interface sends Discovery Solicitations and unsolicited Discovery Advertisements.

Related commands

- **fcoe fcmap**
- **fcoe fka-adv-period**

- **fcoe global fcf-priority**

display interface vfc

Use **display interface vfc** to display VFC interface information.

Syntax

display interface [**vfc**] [**brief** [**down**]]

display interface [**vfc** [*interface-number*]] [**brief** [**description**]]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

interface-number: Specifies a VFC interface by its number in the range of 1 to 1024.

brief: Displays summary information about interfaces. If this keyword is not specified, this command displays detailed information about VFC interfaces.

down: Displays information about the interfaces in physically down state and the causes. If this keyword is not specified, this command displays information about the interfaces in all states.

description: Displays all of the interface description. If this keyword is not specified, this command displays only the first 27 characters of a description if the description contains more than 27 characters.

Usage guidelines

If you do not specify the **vfc** *interface-number* option, this command displays information about all interfaces supported by the device.

If you specify the **vfc** keyword but not the *interface-number* argument, this command displays information about all VFC interfaces.

Examples

Display detailed information about interface VFC 1.

```
<Sysname> display interface vfc 1
Vfc1
Current state: UP
Line protocol state: UP
Description: Vfc1 Interface
Bandwidth: 0kbps
Maximum Transmit Unit: 2112
Internet protocol processing: disabled
Link layer protocol is FC
Port WWN is 66:66:66:63:66:64:61:30
FC mode is E, state is E
```

```
Support the VSAN protocol
VSAN tagging mode is Tagging
EVFP common VSAN: 1
Bound interface is Ten-GigabitEthernet1/0/3, Bound MAC is 000c-2933-eacd
VSAN of physical-UP state: 1
Last clearing of counters: Never
```

Table 2 Command output

Field	Description
Current state	Physical state and administrative state of the VFC interface: • **DOWN (Administratively)**—The interface is administratively shut down by using the **shutdown** command. • **DOWN**—The interface is administratively up but physically down. • **UP**—The interface is up both administratively and physically.
Line protocol state	Link layer protocol state of the VFC interface: DOWN or UP.
Bandwidth	Expected bandwidth of the VFC interface.
Internet protocol processing	IP packet processing capability. If the VFC interface is not configured with an IP address, this field displays **disabled**.
FC mode	Mode of the VFC interface.
state	Final mode through negotiation.
Support the VSAN protocol	Indicates the VFC interface supports the VSAN protocol.
VSAN tagging mode	Link type of the interface: Trunk (Tagging) or Access (Non tagging). VFC interfaces support only Tagging.
EVFP common VSAN	Indicates that the common VSANs are in up state through the EVFP negotiation. This field is displayed only after the link goes up.
Bound interface	Physical interface bound to the VFC interface.
Bound MAC	FCoE MAC address bound to the VFC interface.
VSAN of physical-UP state	List of VSANs that are physically up.
Last clearing of counters	Time when the interface statistics were last cleared by using the **reset counters interface** command. **Never** indicates that the interface statistics have never been cleared since device startup.

Display summary information about interface VFC 1.
```
<Sysname> display interface vfc 1 brief
Brief information on interface(s) under bridge mode:
Link: ADM - administratively down; Stby - standby
Speed or Duplex: (a)/A - auto; H - half; F - full
Type: A - access; T - trunk; H - hybrid
Interface          Link Speed    Duplex Type PVID Description
Vfc1               UP   --       --
```
Display information about and the causes of the VFC interfaces in physically down state.
```
<Sysname> display interface vfc brief down
Brief information on interface(s) under bridge mode:
```

```
Link: ADM - administratively down; Stby - standby
Interface          Link Cause
Vfc1               ADM  Administratively
```

Table 3 Command output

Field	Description
Brief information on interface(s) under bridge mode	Brief information about Layer 2 interfaces.
Link: ADM - administratively down; Stby - standby	• **ADM**—The interface has been shut down by the network administrator. To bring up the interface, execute the **undo shutdown** command. • **Stby**—The interface is a standby interface.
Speed or Duplex: (a)/A - auto; H - half; F - full	For speed: **(a)**—The interface rate is determined by autonegotiation. For duplex: • **(a)/A**—The interface duplex mode is determined by autonegotiation. • **H**—Half duplex. • **F**—Full duplex.
Interface	Interface name.
Link	Physical state of the interface: • **UP**—The interface is physically up. • **DOWN**—The interface is physically down. • **ADM**—The interface has been administratively shut down. To bring up the interface, execute the **undo shutdown** command. • **Stby**—The interface is a standby interface.
Speed	Interface rate in bps.
Duplex	Duplex mode of the interface: • **A**—The duplex mode is determined by autonegotiation. • **F**—Full duplex • **F(a)**—Full duplex as the result of autonegotiation. • **H**—Half duplex. • **H(a)**—Half duplex as the result of autonegotiation.
Type	Link type of the interface: • **A**—Access. • **H**—Hybrid. • **T**—Trunk.
PVID	Port VLAN ID (PVID).
Description	Interface description configured by using the **description** command. Without the **description** keyword, the **display interface brief** command displays at most 27 characters of the description. With the **description** keyword, this command displays all of the description.

Field	Description
Cause	Causes for the physical state of the VFC interface to be Down: • **Not connected**—No physical connection exists (possibly because the network cable is disconnected or faulty). • **Administratively**—The port was shut down with the **shutdown** command. To restore the physical state of the interface, use the **undo shutdown** command.

fc mode

Use **fc mode** to configure the operating mode of a VFC interface.

Use **undo fc mode** to restore the default.

Syntax

fc mode { **e** | **f** | **np** }

undo fc mode

Default

A VFC interface operates in F mode.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

e: Configures the VFC interface to operate in E mode.

f: Configures the VFC interface to operate in F mode.

np: Configures the VFC interface to operate in NP mode.

Usage guidelines

An FC switch provides the following types of ports:

• **F_Port**—Connects to an N_Port or an NP_Port on another FC switch.
• **E_Port**—Connects to an E_Port on another FC switch.
• **NP_Port**—Connects to an F_Port on another FC switch.

E_Ports connect FC switches to form a fabric, and F_Ports connect the nodes to FC switches in the fabric.

VFC interfaces support three modes: E, F (default), and NP.

• When an FC switch is operating in FCF mode, VFC interfaces support E and F modes.
• When an FC switch is operating in NPV mode, FC interfaces support F and NP modes.

Examples

Configure interface VFC 1 to operate in E mode.

```
<Sysname> system-view
[Sysname] interface vfc 1
```

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```
[Sysname-Vfc1] fc mode e
```

fcoe enable

Use **fcoe enable** to enable FCoE for a VLAN and map a specified VSAN to the VLAN.

Use **undo fcoe enable** to disable FCoE for the VLAN.

Syntax

fcoe enable [**vsan** *vsan-id*]

undo fcoe enable

Default

FCoE is disabled on a VLAN.

Views

VLAN view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan *vsan-id*: Specifies a VSAN to be mapped to the VLAN. The *vsan-id* argument is in the range of 1 to 3839. If no VSAN is specified, the VSAN with the same number as the VLAN is mapped. For VLANs 3840 to 4094, you must manually specify VSANs to be mapped.

Usage guidelines

When you use a VFC interface to transmit packets, the Ethernet interface bound to the VFC interface might allow multiple VLANs. You should enable FCoE for a VLAN and map a VSAN to the VLAN, so that the packets from the VSAN are tagged with the VLAN tag and transmitted within the VLAN.

FCoE cannot be enabled for VLAN 1.

VSANs are mapped to VLANs on a one-to-one basis.

You must enable FCoE for the same VLAN and map this VLAN to the same VSAN on the two ends.

An FCoE-capable VLAN allows only FCoE traffic.

All member ports in an FCoE-capable VLAN are isolated and therefore will not form loops. For this reason, STP and other loop detection protocols do not need to run in an FCoE-capable VLAN. Otherwise, FCoE links might be blocked.

Since all member ports in an FCoE-capable VLAN are isolated, a Layer 2 protocol enabled in the FCoE-capable VLAN runs based on the port isolation topology.

Examples

Enable FCoE on VLAN 4 and map VSAN 6 to VLAN 4.

```
<Sysname> system-view
[Sysname] vlan 4
[Sysname-vlan4] fcoe enable vsan 6
```

fcoe fcf-priority

Use **fcoe fcf-priority** to configure the FCF priority for the VFC interface.

Use **undo fcoe fcf-priority** to restore the default.

Syntax

fcoe fcf-priority *priority*

undo fcoe fcf-priority

Default

The default setting is 128.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

priority: Specifies the FCF priority for the VFC interface, in the range of 0 to 255. The smaller the value, the higher the priority.

Usage guidelines

The VFC interface FCF priority is used in the **fcf priority** field in an unsolicited Discovery Advertisement.

An ENode selects the FCF switch with the highest priority from the FCF switches sending Discovery Advertisements and sends a FLOGI request to it for login.

This command is effective only for VFC interfaces in F mode. You can configure this command on VFC interfaces in E mode, but it does not take effect.

Examples

Configure the FCF priority as 12 for interface VFC 1.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fcoe fcf-priority 12
```

fcoe fcmap

Use **fcoe fcmap** to configure an FC-MAP value.

Use **undo fcoe fcmap** to restore the default.

Syntax

fcoe fcmap *fc-map*

undo fcoe fcmap

Default

The default setting is 0x0EFC00.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

fc-map: Specifies the FC-MAP value in the range of 0x0EFC00 to 0x0EFCFF.

Usage guidelines

The FC-MAP value is used to identify an FCoE network. Switches in the same FCoE network must have the same FC-MAP value.

After FC-MAP values are configured, VFC interfaces perform an FIP renegotiation.

Examples

Configure the FC-MAP value as 0x0EFCFF.

```
<Sysname> system-view
[Sysname] fcoe fcmap 0efcff
Changing the FC-MAP will flap all VFC interfaces. Continue? [Y/N]:
```

fcoe fka-adv-period

Use **fcoe fka-adv-period** to configure an FKA advertisement period value.

Use **undo fcoe fka-adv-period** to restore the default.

Syntax

fcoe fka-adv-period *fka-adv-period*

undo fcoe fka-adv-period

Default

The default setting is 8 seconds.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

fka-adv-period: Specifies the FKA advertisement period value in the range of 4 to 600 seconds.

Usage guidelines

The FKA advertisement period determines the length of time it takes the switch to detect the disconnection of a virtual link.

The FKA advertisement period defines the interval for a switch to send unsolicited Discovery Advertisements to its peer switches or ENodes. If the peer switch or ENode fails to receive unsolicited Discovery Advertisements within 2.5 FKA advertisement periods, it deletes the virtual link. The FKA

advertisement period is carried in received unsolicited Discovery Advertisements instead of being configured on the local switch. If the switch fails to receive keepalive frames from the peer ENode within 2.5 FKA advertisement periods, it also deletes the virtual link.

When configuring the FKA advertisement period value on an FCF or NPV switch, use Table 4 as a reference to avoid service disruption.

Table 4 Recommended values for different application scenarios

Recommended value	Application scenarios	Remarks
Less than 90 seconds	Connected to servers, storage devices, or third-party switches.	According to FC-BB-5, the upper limit of the FKA advertisement period value is 90 seconds. In this scenario, a single-MPU FCF switch or NPV switch will experience FCoE traffic disruption during an ISSU reboot, because this ISSU reboot takes more than 225 (2.5*90) seconds and the peer deletes the virtual link for failing to receive unsolicited Discovery Advertisements within 225 seconds.
		To ensure service continuity during an active/standby switchover on an NPV switch or ISSU reboot on a dual-MPU NPV switch, you must also adjust the FKA advertisement period value on the upstream FCF switch. This is because the FKA advertisement period value configured on the NPV switch affects only its VFC interfaces in F mode and connected ENodes, and its VFC interfaces in NP mode use the FKA advertisement period value learned from the upstream FCF switch.
60–90 seconds	Active/standby switchover on the switch takes more than 2.5 x 60 seconds because of the amount of FCoE configuration. ISSU reboot on a dual-MPU switch takes more than 2.5 x 60 seconds because of the amount of FCoE configuration.	For more information about ISSU, see *Fundamentals Configuration Guide*.
300–600 seconds	ISSU reboot on a single-MPU switch to which no nodes are attached.	During an ISSU reboot on a single-MPU switch, the switch cannot send unsolicited Discovery Advertisements or keepalive frames.

Examples

Configure the FKA advertisement period value as 20 seconds.
```
<Sysname> system-view
[Sysname] fcoe fka-adv-period 20
```

fcoe global fcf-priority

Use **fcoe global fcf-priority** to configure the system FCF priority.

Use **undo fcoe global fcf-priority** to restore the default.

Syntax

fcoe global fcf-priority *priority*

undo fcoe global fcf-priority

Default

The default setting is 128.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

priority: Specifies the system FCF priority in the range of 0 to 255. The smaller the value, the higher the priority.

Usage guidelines

The system FCF priority is used in the **fcf priority** field in an unsolicited Discovery Advertisement.

An ENode selects the FCF switch with the highest priority from the FCF switches sending Discovery Advertisements and sends a FLOGI request to it for login.

This command is effective for all VFC interfaces in F mode.

Examples

Configure the system FCF priority as 12.

```
<Sysname> system-view
[Sysname] fcoe global fcf-priority 12
```

interface vfc

Use **interface vfc** to create a VFC interface and enter its view. If the VFC interface already exists, you enter VFC interface view directly.

Use **undo interface vfc** to delete a VFC interface.

Syntax

interface vfc *interface-number*

undo interface vfc *interface-number*

Default

No VFC interface exists.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

interface-number: Number of the VFC interface to be created, in the range of 1 to 1024.

Usage guidelines

A VFC interface is a logical interface manually created on the FCF switch to simulate the function of a physical FC interface.

Examples

Create interface VFC 1 and enter its view.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1]
```

Related commands

display interface vfc

reset counters interface

Use **reset counters interface** to clear the statistics for VFC interfaces.

Syntax

reset counters interface [**vfc** [*number*]]

Views

User view

Predefined user roles

network-admin

mdc-admin

Parameters

number: Specifies a VFC interface by its number.

Usage guidelines

Clear the existing statistics before collecting traffic statistics within a specific period of time on an interface.

If you do not specify the **vfc** *number* option, this command clears the statistics for all interfaces.

If you specify **vfc** but not *number*, this command clears the statistics for all VFC interfaces.

If you specify both **vfc** and *number*, this command clears the statistics for the specified VFC interface.

Examples

Clear the statistics for interface VFC 1.

```
<Sysname> reset counters interface fc-bundle 10
```

Related commands

display interface vfc

shutdown

Use **shutdown** to shut down the VFC interface.

Use **undo shutdown** to bring up the VFC interface.

Syntax

shutdown

undo shutdown

Default

A VFC interface is up.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Examples

Bring up interface VFC 1.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] undo shutdown
```

FIP snooping commands

display fip-snooping enode

Use **display fip-snooping enode** to display ENode information obtained by a Transit switch.

Syntax

display fip-snooping enode [**vlan** *vlan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vlan *vlan-id*: Specifies a VLAN by its ID in the range of 1 to 4094. If no VLAN is specified, this command displays ENode information for all VLANs.

Examples

Display ENode information obtained by a Transit switch.

```
<Sysname> display fip-snooping enode
VLAN 2:
Interface    ENode WWN                 ENode MAC
XGE1/0/1     21:01:00:1b:32:a0:fa:18   000c-2999-eacd
```

Table 5 Command output

Field	Description
Interface	Ethernet interface connecting the Transit switch to the ENode.
ENode MAC	FCoE MAC address of the ENode.

display fip-snooping fcf

Use **display fip-snooping fcf** to display FCF switch information obtained by a Transit switch.

Syntax

display fip-snooping fcf [**vlan** *vlan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vlan *vlan-id*: Specifies a VLAN by its ID in the range of 1 to 4094. If no VLAN is specified, this command displays FCF switch information for all VLANs.

Examples

\# Display FCF switch information obtained by a Transit switch.

```
<Sysname> display fip-snooping fcf
VLAN 3:
Interface   FCF MAC       FCF WWN                   Fabric Name              ENode
XGE1/0/1    000c-2999-eacd 66:66:66:63:66:64:61:30 41:6e:64:69:61:6d:6f:21 1
XGE1/0/2    000c-2999-eaad 66:66:66:63:66:64:61:31 41:6e:64:69:61:6d:6f:22 2
```

Table 6 Command output

Field	Description
Interface	Ethernet interface connecting the Transit switch to the FCF switch.
FCF MAC	FCoE MAC address of the FCF switch.
ENode	Number of ENodes attached to an FCF switch.

display fip-snooping flushing-rules

Use **display fip-snooping flushing-rules** to display the FIP snooping rules that are being flushed.

Syntax

display fip-snooping flushing-rules [**enode** | **fcf**] [**vlan** *vlan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

enode: Displays the ENode FIP snooping rules that are being flushed.

fcf: Displays the FCF FIP snooping rules that are being flushed.

vlan *vlan-id*: Specifies a VLAN by its ID in the range of 1 to 4094. If no VLAN is specified, this command displays the FIP snooping rules that are being flushed for all VLANs.

Usage guidelines

Only the FIP snooping rules that have been flushed can be used to filter FCoE frames. FIP snooping rules that are being flushed cannot be used to filter FCoE frames.

If you do not specify either **enode** or **fcf**, this command displays both ENode and FCF FIP snooping rules that are being flushed.

Examples

Display the FIP snooping rules that are being flushed.

```
<Sysname> display fip-snooping flushing-rules
VLAN 2:
  FCF flushing-rules information:
    Interface    Source MAC/Mask      Destination MAC/Mask
    XGE1/0/3     0000-1234-0212/48    0efc-0034-0111/24
  ENode flushing-rules information:
    Interface    Source MAC/Mask      Destination MAC/Mask
    XGE1/0/1     0efc-0034-0202/48    0000-1234-0101/48

VLAN 5:
  FCF flushing-rules information:
    Interface    Source MAC/Mask      Destination MAC/Mask
    XGE1/0/4     0000-1234-2212/48    0efc-0034-2111/24
```

Table 7 Command output

Field	Description
Interface	Ethernet interface on the Transit switch.

Related commands

display fip-snooping rules

display fip-snooping rules

Use **display fip-snooping rules** to display the FIP snooping rules that have been flushed.

Syntax

In standalone mode:

display fip-snooping rules [**enode** | **fcf**] [**vlan** *vlan-id*] [**slot** *slot-number*]

In IRF mode:

display fip-snooping rules [**enode** | **fcf**] [**vlan** *vlan-id*] [**chassis** *chassis-number* **slot** *slot-number*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

enode: Displays the ENode FIP snooping rules that have been flushed.

fcf: Displays the FCF FIP snooping rules that have been flushed.

vlan *vlan-id*: Specifies a VLAN by its ID in the range of 1 to 4094. If no VLAN is specified, this command displays the FIP snooping rules that have been flushed for all VLANs.

slot *slot-number*: Specifies a card by its slot number. If no card is specified, this command displays the FIP snooping rules that have been flushed on the MPU. (In standalone mode.)

chassis *chassis-number* **slot** *slot-number*: Specifies a card on an IRF member device. The *chassis-number* argument represents the IRF member ID, and the *slot-number* argument represents the slot number of the card. If no card is specified, this command displays the FIP snooping rules that have been flushed on the global active MPU. (In IRF mode.)

Usage guidelines

Only the FIP snooping rules that have been flushed can be used to filter FCoE frames. FIP snooping rules that are being flushed cannot be used to filter FCoE frames.

If you do not specify either **enode** or **fcf**, this command displays both ENode and FCF FIP snooping rules that have been flushed.

Examples

Display the FIP snooping rules that have been flushed.
```
<Sysname> display fip-snooping rules slot 1
VLAN 2:
  FCF rules information:
    Interface    Source MAC/Mask     Destination MAC/Mask   DriverContext
    XGE1/0/1     0000-1234-0202/48   0efc-0034-0101/24        ffffffff
  ENode rules information:
    Interface    Source MAC/Mask     Destination MAC/Mask   DriverContext
    XGE1/0/3     0efc-0034-0102/48   0000-1234-0201/48        ffffffff

VLAN 4:
  FCF rules information:
    Interface  Source MAC/Mask     Destination MAC/Mask   DriverContext
    XGE1/0/2   0000-1234-1202/48   0efc-0034-1101/24        ffffffff
```

Table 8 Command output

Field	Description
Interface	Ethernet interface on the Transit switch.

Related commands

display fip-snooping flushing-rules

display fip-snooping sessions

Use **display fip-snooping sessions** to display information about FIP snooping sessions (connections between ENodes and FCF switches).

Syntax

display fip-snooping sessions [**vlan** *vlan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vlan *vlan-id*: Specifies a VLAN by its ID in the range of 1 to 4094. If no VLAN is specified, this command displays information about FIP snooping sessions for all VLANs.

Examples

\# Display information about FIP snooping sessions.

```
<Sysname> display fip-snooping sessions
VLAN 2:
FCF MAC         ENode MAC        VN_Port MAC     VN_Port WWN
0000-1234-0202  0000-1234-0100   0efc-00ae-0002  41:6e:64:69:61:6d:6f:21
```

Table 9 Command output

Field	Description
FCF MAC	FCoE MAC address of the FCF switch.
ENode MAC	FCoE MAC address of the ENode.
VN_Port MAC	MAC address of a VN port.

fip-snooping enable

Use **fip-snooping enable** to enable FIP snooping for a VLAN.

Use **undo fip-snooping enable** to restore the default.

Syntax

fip-snooping enable

undo fip-snooping enable

Default

FIP snooping is disabled.

Views

VLAN view

Predefined user roles

network-admin

mdc-admin

23

Usage guidelines

To enable a VLAN on a Transit switch to process FCoE frames and FIP frames, enable FIP snooping for the VLAN.

Examples

Enable FIP snooping for VLAN 10.

```
<Sysname> system-view
[Sysname] vlan 10
[Sysname-vlan10] fip-snooping enable
```

fip-snooping fc-map

Use **fip-snooping fc-map** to configure an FC-MAP value for a VLAN.

Use **undo fip-snooping fc-map** to restore the default.

Syntax

fip-snooping fc-map *fc-map*

undo fip-snooping fc-map

Default

The FC-MAP value for a VLAN is 0x0EFC00.

Views

VLAN view

Predefined user roles

network-admin

mdc-admin

Parameters

fc-map: Specifies an FC-MAP value in the range of 0x0EFC00 to 0x0EFCFF.

Usage guidelines

An Ethernet interface in a VLAN on a Transit switch checks whether the FC-MAP value in a received frame is the same as that configured for the VLAN. If it is the same, the interface forwards the frame. If it is different, the interface drops the frame.

Examples

Configure an FC-MAP value of 0x0EFCFF for VLAN 10.

```
<Sysname> system-view
[Sysname] vlan 10
[Sysname-vlan 10] fip-snooping fc-map 0efcff
```

Related commands

fcoe fcmap

fip-snooping port-mode

Use **fip-snooping port-mode** to configure the operating mode of an interface.

Use **undo fip-snooping port-mode** to restore the default.

Syntax

fip-snooping port-mode { **enode** | **fcf** }

undo fip-snooping port-mode

Default

An Ethernet interface operates in ENode mode.

Views

Layer 2 Ethernet interface view, Layer 2 aggregate interface view

Predefined user roles

network-admin

mdc-admin

Parameters

enode: Specifies the ENode mode.

fcf: Specifies the FCF mode.

Usage guidelines

Ethernet interfaces on a Transit switch can operate in ENode mode or FCF mode. An Ethernet interface connected to an ENode must be configured to operate in ENode mode. An Ethernet interface connected to an FCF switch must be configured to operate in FCF mode.

Examples

Configure interface Ten-GigabitEthernet 1/0/2 to operate in FCF mode.

```
<Sysname> system-view
[Sysname] interface ten-gigabitethernet 1/0/2
[Sysname-ten-gigabitethernet1/0/2] fip-snooping port-mode fcf
```

Fabric setup commands

allowed-domain-id

Use **allowed-domain-id** to specify the allowed domain ID list for a specific VSAN on the switch.

Use **undo allowed-domain-id** to restore the default.

Syntax

allowed-domain-id *domain-id-list*

undo allowed-domain-id *domain-id-list*

Default

The default setting is 1 to 239.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

domain-id-list: Specifies a list of allowed domain IDs, in the format of *domain-id-list* = { *domain-id1* [**to** *domain-id2*] }&<1-8>, where *domain-id1* and *domain-id2* specify domain IDs in the range of 1 to 239 and *domain-id2* must be no smaller than *domain-id1*. &<1-8> indicates that you can specify up to eight *domain-id1* [**to** *domain-id2*] parameters.

Usage guidelines

Each FCF switch is assigned a domain ID. You can specify the allowed domain ID list.

Configuring the allowed domain ID list has an effect on switches as follows:

- **Principal switch**—Can only assign domains IDs within the allowed domain ID list. If the allowed domain ID list configured does not include any of the already assigned domain IDs or manually configured domain IDs, the configuration will fail.

- **Non-principal switch**—The manually configured domain ID must be within the allowed domain ID list. Otherwise, the configuration will fail. The principal switch must assign the switch a domain ID within the allowed domain ID list. Otherwise, the switch refuses the assigned domain ID and isolates its interface connected to the principal switch. If the runtime domain ID for a switch is beyond the new allowed domain ID list, the configuration will also fail.

HP recommends that you specify the same allowed domain ID list for a VSAN on each member switch of the VSAN.

Examples

Configure VSAN 1 to allow domains 3 through 10.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] allowed-domain-id 3 to 10
```

display fc domain

Use **display fc domain** to display the domain information of the specified VSAN.

Syntax

display fc domain [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the domain information of all VSANs.

Usage guidelines

Domain information displayed by using this command includes runtime and configuration information of the local switch and runtime information of the principal switch.

Examples

Display the domain information of VSAN 1.

```
<Sysname> display fc domain vsan 1
Domain Information of VSAN 1:

    Running time information:
        State: Stable
        Switch WWN: 41:6e:64:69:61:6d:6f:21
        Fabric name: 41:6e:64:69:61:6d:6f:21
        Priority: 2
        Domain ID: 100
    Configuration information:
        Domain configure: Enabled
        Domain auto-reconfigure: Disabled
        Fabric name: 41:6e:64:69:61:6d:6f:21
        Priority: 128
        Domain ID: 100 (static)
    Principal switch running time information:
        Priority: 2

    Path                Interface
    Downstream          Vfc1
    Downstream          Vfc2
    Downstream          Vfc4
```

Table 10 Command output

Field	Description
State	Running status: • **Stable**—The configuration is finished. • **Unstable**—The configuration is not finished.
Switch WWN	WWN of the local switch.
Fabric name	Name of the fabric.
Priority	Running priority of the local switch.
Domain ID	Runtime domain ID of the local switch.
Configuration information	Configuration information of the local switch.
Domain configure	State of the fabric configuration function: • **Enabled**—The fabric configuration function is enabled. • **Disabled**—The fabric configuration function is disabled.
Domain auto-reconfigure	State of the auto reconfiguration function: • **Enabled**—The auto reconfiguration function is enabled on the switch. • **Disabled**—The auto reconfiguration function is disabled on the switch.
Fabric name	Fabric name configured on the switch.
Priority	Locally configured priority of the switch.
Domain ID	Locally configured domain ID. The field in the parentheses can be one of the following: • **static**—The domain ID is **static** type. • **preferred**—The domain ID is **preferred** type.
Principal switch running time information	Runtime information of the principal switch.
Priority	Running priority of the principal switch.
Path	Path type of the interface: • **Upstream**—Upstream principal link. • **Downstream**—Downstream principal link.
Interface	Local VFC interface.

display fc domain-list

Use **display fc domain-list** to display the list of domain IDs dynamically assigned in a specified VSAN.

Syntax

display fc domain-list [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the lists of domain IDs dynamically assigned in all VSANs.

Usage guidelines

For a dynamically built fabric, you can use this command to display the list of domain IDs dynamically assigned in a specified VSAN, including the total number of domains and mappings between domain IDs and switch WWNs.

Examples

\# Display the list of domain IDs dynamically assigned in VSAN 1.

```
<Sysname> display fc domain-list vsan 1
Domain list of VSAN 1:
  Number of domains: 3

  Domain ID    WWN
  0xc8(200)    20:01:00:05:30:00:47:df [Principal]
  0x63(99)     20:01:00:0d:ec:08:60:c1 [Local]
  0x61(97)     50:00:53:0f:ff:f0:10:06
```

Table 11 Command output

Field	Description
Domain list of VSAN	Domain ID list of the VSAN.
Number of domains	Total number of domains.
WWN	WWN of the switch. **Principal** indicates a principal switch, and **Local** indicates a local switch.

Related commands

domain configure enable

display fc ess

Use **display fc ess** to display the Exchange Switch Support (ESS) negotiation result, including the capabilities of the local switch and the capabilities of the remote switch after the ESS negotiation.

Syntax

display fc ess [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the ESS negotiation results of all VSANs.

Examples

Display the ESS negotiation result in VSAN 2.

```
<Sysname> display fc ess vsan 2
ESS info of VSAN 2:
  Domain: 210
    Directory Server Capability:
      Accept large name server objects: Yes
      Accept small name server objects: No
      Accept large + FC-4 Features name server objects: No
      Accept small + FC-4 Features name server objects: No
      Support receiving ACCept with 0 length: Yes
    Fabric Controller Capability:
     Support receiving the SW_RSCN Request: Yes
    Fabric Configuration Server Capability:
      Support basic configuration services: Yes
      Support platform configuration services: No
      Support topology discovery configuration services: Yes
      Support enhanced configuration services: Yes
```

Table 12 Command output

Field	Description
Domain	Domain ID of the switch.
Directory Server Capability	List of directory server capabilities.
Accept large name server objects	Indicates whether the switch supports accepting large name server objects (**yes** for supported and **no** for not supported). A large name server object contains the symbolic name of the N_Port and the symbolic name of the node in addition to the information of a small name server object.
Accept small name server objects	Indicates whether the switch supports accepting small name server objects (**yes** for supported and **no** for not supported). A small name server objects contains only the basic information, and does not contain the symbolic name of the N_Port, the symbolic name of the node, or information about supported FC-4 features.
Accept large + FC-4 Features name server objects	Indicates whether the switch supports accepting large + FC-4-feature name server objects (**yes** for supported and **no** for not supported).
Accept small + FC-4 Features name server objects	Indicates whether the switch supports accepting small + FC-4-feature name server objects (**yes** for supported and **no** for not supported).
Support receiving ACCept with 0 length	Indicates whether the switch supports accepting an ACCEPT reply whose payload is 0 (**yes** for supported and **no** for not supported).

Field	Description
Fabric Controller Capability	List of fabric controller capabilities.
Support receiving the SW_RSCN Request	Indicates whether the switch supports accepting an SW_RSCN (Registered State Change Notification) request (**yes** for supported and **no** for not supported).

display fc login

Use **display fc login** to display the node login information of the specified VSANs.

Syntax

display fc login [**vsan** *vsan-id*] [**count**]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the node login information of all VSANs.

count: Displays the total number of logged-in nodes.

Examples

Display the node login information of VSAN 1.

```
<Sysname> display fc login vsan 1
Interface VSAN FCID      Node WWN                 Port WWN
Vfc1      1    0x010000 21:01:00:1b:32:a0:fa:18 21:01:00:1b:32:a0:fa:17
```

Display the number of logged-in nodes for VSAN 1.

```
<Sysname> display fc login vsan 1 count
Total entries: 1
```

Display the total number of logged-in nodes for all VSANs.

```
<Sysname> display fc login count
VSAN       Entries
1          1
2          1

Total entries: 2
```

Table 13 Command output

Field	Description
Interface	Interface on the switch connected to the node.

Field	Description
VSAN	VSAN ID.
FCID	FC address assigned by the switch to the node.
Port WWN	WWN of the port connecting the node to the switch.

display fc name-service database

Use **display fc name-service database** to display the name server database information.

Syntax

display fc name-service database [**vsan** *vsan-id* [**fcid** *fcid*]] [**verbose**]

display fc name-service database [**vsan** *vsan-id*] **count**

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the name server database information of all VSANs.

fcid *fcid*: Specifies an FC address. The *fcid* argument is in the range of 0x010000 to 0xEFFFFF (hexadecimal). If no FC address is specified, this command displays the name server database entries of all FC addresses.

verbose: Displays detailed information about the name service database. If you do not specify this keyword, this command displays brief information about the name server database.

count: Displays the number of name service entries.

Examples

Display brief information about the name server database in VSAN 1.

```
<Sysname> display fc name-service database vsan 1
VSAN 1:
  FCID      Type              PWWN(vendor)                    FC4-type:feature
  0x030001 0x01(N)            10:00:00:05:30:00:25:a3         SCSI-FCP
  0x030101 0x01(N)            10:00:00:00:77:99:60:2c
  0x030200 0x01(N)            10:00:00:49:c9:28:c7:01
  0xec0001 0x01(N)            21:00:00:20:37:a6:be:14         SCSI-FCP
```

Display the number of name service entries for VSAN 1.

```
<Sysname> display fc name-service database vsan 1 count
Total entries: 2
```

Table 14 Command output

Field	Description
FCID	FC address of the N_Port.
Type	Link type of the N_Port, which can be N representing point-to-point.
PWWN(vendor)	WWN of the N_Port (name of vendor).
FC4-type:feature	FC4 type feature entry (when this command displays brief information, up to two FC4 type feature entries are displayed): • **FC4 type**—Includes SCSI-FCP, LLC/SNAP, SW_ILS, SNMP, GS3, VI, and NPV. • **Feature**—Includes supporting Initiator, Target, or Initiator/Target.

Display detailed information about the name service database.

```
<Sysname> display fc name-service database verbose
VSAN:1    FCID:0x030001
  Port-WWN(vendor): 10:00:00:05:30:00:25:a3
  Node-WWN: 20:00:00:05:30:00:25:9e
  Class: 2,3
  Node-IP-addr: 192.168.0.52
  FC4-types(FC4_features): SCSI-FCP
  Symbolic-port-name:
  Symbolic-node-name:
  Port-type: 0x01(N)
  Fabric-port-WWN: 30:30:30:30:65:33:64:6
  Hard-addr: 0x000000

VSAN:1    FCID:0xec0200
  Port-WWN(vendor): 10:00:00:5a:c9:28:c7:01
  Node-WWN: 10:00:00:5a:c9:28:c7:01
  Class: 3
  Node-IP-addr: 192.168.0.52
  FC4-types(FC4_features):
  Symbolic-port-name:
  Symbolic-node-name:
  Port-type: 0x01(N)
  Fabric-port-WWN: 22:0a:00:05:30:00:26:1e
  Hard-addr: 0x000000

--- Total 2 entries ---
```

Table 15 Command output

Field	Description
FCID	FC address of the N_Port.

Field	Description
Type	Port type registered by the node with the switch: • **0x00(Unidentified)**—No port type is registered. • **0x01(N)**—N_Port, which directly connects to the fabric. • **0x02(NL)**—NL_Port, which connects to the fabric through an arbitrated loop. • **0x03(F/NL)**—F_Port or NL_Port. • **0x7f(Nx)**—N_Port, NL_Port, or F_Port or NL_Port. • **0x81(F)**—F_Port, which connects to an N_Port. • **0x82(FL)**—FL_Port, which connects to an NL_Port. • **0x84(E)**—E_Port, which connects to an E_Port or B_Port. • **0x85(B)**—B_Port. The ports on a bridge that connect two E_Ports are called B_Ports. • **0xXX(Unknown)**—Port types other than the preceding ones. NOTE: Only N_Ports and NL_Ports will be registered by a node.
Port-WWN(vendor)	WWN of the N_Port (name of vendor).
Node-WWN	WWN of the node.
Class	Class of service.
Node-IP-addr	IP address of the node.
FC4-types(FC4 features)	FC4 type (feature) entries: • **FC4 type**—Includes SCSI-FCP, LLC/SNAP, SW_ILS, SNMP, GS3, VI, and NPV. • **Feature**—Includes supporting Initiator, Target, or Initiator/Target.
Symbolic-port-name	Symbolic name, which is used for describing the N_Port.
Symbolic-node-name	Symbolic name, which is used for describing the node.
Port-type	Link type of the N_Port, which can be N representing point-to-point.
Fabric-port-WWN	WWN of the F_Port.
Hard-addr	Hardware address of the N_Port.
Total entries	Number of entries in the VSAN.

display fc scr-table

Use **display fc scr-table** to display the State Change Registration (SCR) list of N_Ports.

Syntax

display fc scr-table [**vsan** *vsan-id*] [**count**]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Displays the SCR list in the specified VSAN. The *vsan-id* argument is in the range of 1 to 3839. If no VSAN is specified, this command displays the SCR lists of all VSANs.

count: Displays the number of SCR entries.

Examples

\# Display the SCR list.

```
<Sysname> display fc scr-table
SCR table for VSAN 1:
FCID          REGISTERED FOR
0x1b0300      fabric detected rscns
0x010121      nx_port detected rscns

--- Total 2 entries ---
```

\# Display the number of SCR entries.

```
<Sysname> display fc scr-table vsan 1 count
Total entries: 2
```

Table 16 Command output

Field	Description
SCR table for VSAN	SCR list in a specified VSAN.
FCID	FC address of the N_Port.
REGISTERED FOR	Type of Registered State Change Notification (RSCN) messages and accept: • **fabric detected rscns**—Accepts all RSCN messages sent by the switches in the fabric. • **nx_port detected rscns**—Accepts all RSCN messages sent by N_Ports. • **full detected rscns**—Accepts all RSCN messages.
Total entries	Number of SCR entries in the VSAN.

display fc timer

Use **display fc timer** to display fabric timers.

Syntax

display fc timer [**distributed-services** | **error-detect** | **resource-allocation**] [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

distributed-services: Displays the distributed service timeout period, in milliseconds.

error-detect: Displays the error detection timeout period, in milliseconds.

resource-allocation: Displays the resource allocation timeout period, in milliseconds.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays global fabric timer information.

Usage guidelines

If you do not specify the **distributed-services**, **error-detect**, or **resource-allocation** keyword, this command displays all the fabric timers.

Examples

Display all the fabric timers for VSAN 1.

```
<Sysname> display fc timer vsan 1
Timer of VSAN 1:
  Distributed-services timer: 5000 ms
  Error-detect timer:         2000 ms
  Resource-allocation timer:  10000 ms
```

domain auto-reconfigure enable

Use **domain auto-reconfigure enable** to enable the auto fabric reconfiguration function for the switch in a specified VSAN.

Use **undo domain auto-reconfigure enable** to restore the default.

Syntax

domain auto-reconfigure enable

undo domain auto-reconfigure enable

Default

The auto fabric reconfiguration function is disabled in each VSAN.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

This command is available only when the fabric configuration function is enabled.

The fabric reconfiguration triggers principal switch selection, domain ID assignment, and FC address assignment throughout the fabric.

Auto fabric reconfiguration occurs in the event of network faults or fabric merges as follows:

- When two fabrics are merged:
  - The switches automatically perform a disruptive reconfiguration if the domain ID lists overlap.

- The system automatically performs a non-disruptive reconfiguration if the principal switch information of the two fabrics is different and the domain ID lists are not empty or overlapping.
- When the principal switch in a fabric is down, the system automatically performs a non-disruptive reconfiguration.

Examples

\# Enable the auto fabric reconfiguration function for the switch in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] domain auto-reconfigure enable
```

Related commands

domain configure enable

domain configure enable

Use **domain configure enable** to enable the fabric configuration function for the switch in a specified VSAN.

Use **undo domain configure enable** to disable the fabric configuration function for the switch in a specified VSAN.

Syntax

domain configure enable

undo domain configure enable

Default

The fabric configuration function is enabled in each VSAN.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

After being enabled with the fabric configuration function, FCF switches exchange messages to select the principal switch. Then, the principal switch dynamically assigns domain IDs to all switches in the fabric. To dynamically build a fabric, you must enable the fabric configuration function on switches. To statically set up a fabric, you must disable the fabric configuration function on switches and manually configure domain IDs for the switches.

Examples

\# Enable the fabric configuration function for the switch in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] domain configure enable
```

domain restart

Use **domain restart** to configure the switch to initiate a fabric reconfiguration in a specified VSAN.

domain restart [**disruptive**]

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

disruptive: Initiates a disruptive reconfiguration. If you do not specify this keyword, this command initiates a non-disruptive reconfiguration.

Usage guidelines

This command is available only when the fabric configuration function is enabled.

The fabric reconfiguration occurs in the case of a network reconstruction (for example, two fabrics are merged) or external intervention (for example, the administrator uses a command to initiate reconfiguration). The fabric reconfiguration triggers principal switch selection, domain ID assignment, and FC address assignment throughout the fabric.

The fabric reconfiguration includes the following categories:

- **Disruptive reconfiguration**—Floods the ReConfigure Fabric (RCF) frames throughout the fabric and notifies all switches to perform a disruptive reconfiguration. During the reconfiguration procedure, each switch clears all data for renegotiation, and data transmission in the fabric is disrupted.
- **Non-disruptive reconfiguration**—Floods the Build Fabric (BF) frames throughout the fabric and notifies all switches to perform a non-disruptive reconfiguration. During the reconfiguration procedure, each switch tries to save the last running data for its domain ID to remain unchanged. Thus, data transmission in the fabric is not disrupted.

For fabric settings such as switch priority modification that are not immediately effective, perform a disruptive reconfiguration to make them take effect.

Examples

Configure the switch to initiate a disruptive reconfiguration in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] domain restart disruptive
The command may cause traffic interruption. Continue? [Y/N]:y
```

Related commands

domain configure enable

domain-id

Use **domain-id** to specify a domain ID for the switch in a specified VSAN.

Use **undo domain-id** to restore the default.

Syntax

domain-id *domain-id* { **preferred** | **static** }

undo domain-id

Default

The domain ID of a switch is 0 in each VSAN and is **preferred** type.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

domain-id: Specifies a domain ID in the range of 1 to 239.

preferred: Specifies the domain ID as the preferred type.

static: Specifies the domain ID as the static type.

Usage guidelines

The upper layer protocol identifies only the WWN, but FCF switches use domain IDs to route and forward packets. Domain IDs are assigned on a per-VSAN basis and have a default value of 0, which cannot distinguish devices. Therefore, you must statically configure or dynamically assign domain IDs for FC switches.

In the static domain ID assignment approach, the ID type configuration does not affect the assignment result.

In the dynamic domain ID assignment approach, the principal switch assigns a domain ID to each switch in the fabric. If a member switch fails to get a preferred-type domain ID from the principal switch, it accepts any other domain ID assigned by the principal switch. If the member switch fails to get a static-type domain ID, it does not accept any other domain ID, and isolates the upstream link.

HP recommends that you specify the same type of domain IDs for all switches in the same VSAN.

Examples

Specify static-type domain ID 55 for the switch in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] domain-id 55 static
Non-disruptive reconfiguration or isolating the switch may be performed. Continue? [Y/N]:
```

fabric-name

Use **fabric-name** to specify a fabric name for the switch in a specified VSAN.

Use **undo fabric-name** to restore the default.

Syntax

fabric-name *name*

undo fabric-name

Default

The fabric name is null.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

name: Specifies a fabric name, in the format of xx:xx:xx:xx:xx:xx:xx:xx, where x is a hexadecimal number.

Usage guidelines

An FCF switch supports assigning a fabric name to each VSAN, in the same format as the WWN (a 64-bit address). If no fabric name is configured when a VSAN is created, the switch's WWN is used as the fabric name for the VSAN.

You need to configure the fabric name only when a fabric is built statically. You must configure the same fabric name on all switches in a VSAN. When a fabric is built dynamically, the WWN of the principal switch is used as the fabric name.

Examples

Specify a fabric name for the switch in VSAN 1.
```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] fabric-name 10:11:12:13:14:15:16:17
```

fc domain rcf-reject

Use **fc domain rcf-reject** to configure the interface to reject the ReConfigure Fabric (RCF) requests received in the specified VSAN.

Use **undo fc domain rcf-reject** to restore the default.

Syntax

fc domain rcf-reject vsan *vsan-id*

undo fc domain rcf-reject vsan *vsan-id*

Default

An interface does not reject the received RCF requests.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

In a stable fabric, to avoid unnecessary disruptive reconfigurations, you can configure an FC interface to reject the RCF requests received from a specific VSAN by replying with a reject message. With this feature, the interface that receives an RCF request is isolated.

Examples

Configure interface VFC 1 to reject the RCF requests received in VSAN 1.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fc domain rcf-reject vsan 1
```

fc name-service auto-discovery

Use **fc name-service auto-discovery** to enable auto discovery of SCSI-FCP information.

Use **undo fc name-service auto-discovery** to disable auto discovery of SCSI-FCP information.

Syntax

fc name-service auto-discovery

undo fc name-service auto-discovery

Default

Auto discovery of SCSI-FCP information is enabled.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

In some situations, for example, when a node logs out and then logs back in, the node does not register SCSI-FCP support. Therefore, the node does not have a **Feature** value. This might cause communication failure between the node and other nodes.

When this command is enabled, the switch automatically obtains the SCSI-FCP support and the **Feature** value by sending a PRLI packet to the node that is logging in. Then, the switch stores the SCSI-FCP information in the name service database.

NOTE:

After this feature is enabled, nodes with older-model HBAs might not actively register name service information with the switch.

Examples

Enable auto discovery of SCSI-FCP information in VSAN 2.

```
<Sysname> system-view
[Sysname] vsan 2
```

```
[Sysname-vsan2] fc name-server auto-discovery
```

fc timer distributed-services

Use **fc timer distributed-services** to specify the distributed service timeout period globally.

Use **undo fc timer distributed-services** to restore the default.

Syntax

fc timer distributed-services *value*

undo fc timer distributed-services

Default

The global distributed service timeout period is 5000 milliseconds.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the distributed service timeout period in the range of 5000 to 10000 milliseconds.

Usage guidelines

The distributed service timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the distributed service timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the global distributed service timeout period to 6000 milliseconds.
```
<Sysname> system-view
[Sysname] fc timer distributed-services 6000
```

Related commands

timer distributed-services

fc timer error-detect

Use **fc timer error-detect** to specify the error detection timeout period globally.

Use **undo fc timer error-detect** to restore the default.

Syntax

fc timer error-detect *value*

undo fc timer error-detect

Default

The global error detection timeout period is 2000 milliseconds.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the error detection timeout period in the range of 1000 to 10000 milliseconds.

Usage guidelines

The error detection timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the error detection timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the global error detection timeout period to 6000 milliseconds.

```
<Sysname> system-view
[Sysname] fc timer error-detect 6000
```

Related commands

timer error-detect

fc timer resource-allocation

Use **fc timer resource-allocation** to specify the resource allocation timeout period globally.

Use **undo fc timer resource-allocation** to restore the default.

Syntax

fc timer resource-allocation *value*

undo fc timer resource-allocation

Default

The global resource allocation timeout period is 10000 milliseconds.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the resource allocation timeout period in the range of 5000 to 10000 milliseconds.

The resource allocation timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the resource allocation timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the global resource allocation timeout period to 6000 milliseconds.

```
<Sysname> system-view
[Sysname] fc timer resource-allocation 6000
```

Related commands

timer resource-allocation

fc wwn default-fc4-type

Use **fc wwn default-fc4-type** to configure the default FC4 information for a node.

Use **undo fc wwn default-fc4-type** to delete the default FC4 information of a node.

Syntax

fc wwn *wwn-value* **default-fc4-type** { *type-value* **feature** *feature-map* | **scsi-fcp feature** { *feature-map* | **both** | **initiator** | **target** } }

undo fc wwn *wwn-value* **default-fc4-type** { *type-value* | **scsi-fcp** }

Default

No default FC4 information is configured.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

wwn-value: Specifies an N_Port by its WWN in the format of *xx:xx:xx:xx:xx:xx:xx:xx* (hexadecimal).

type-value: Specifies a supported FC4-Type by its value in the range of 0 to 255. The FC4-Type field is 256 bits, each of which represents an FC4-Type. If a bit is set to 1, the FC4-Type that the bit represents is supported. Only one bit can be set to 1 at the same time.

scsi-fcp: Specifies the supported FC4-Type as SCSI-FCP, which has a *type-value* of 8.

feature *feature-map*: Specifies the Feature value for the supported FC4-Type. The value range for *feature-map* is 0 to 15. The Feature field is 4 bits, each of which represents a Feature. If a bit is set to 1, the Feature that the bit represents is supported. More than one bit can be set to 1 at the same time. For example, if the value is set to 15, the node supports four features of the FC4-Type. If the value is set to 0, the node supports none of the four features. When you specify supported FC4-Type as SCSI-FCP, you can configure the following keywords:

- **initiator**: Specifies support for the initiator feature, which has a *feature-map* of 2.

- **target**: Specifies support for the target feature, which has a *feature-map* of 1.
- **both**: Specifies support for both initiator and target features, which has a *feature-map* of 3.

Usage guidelines

If a node does not register FC4 information and the switch fails to obtain SCSI-FCP information from the node, the switch records the default FC4 information in the name service database for that node. When a node registers FC4 information or the switch obtains the SCSI-FCP information, the switch replaces the default FC4 information with the registered FC4 information or obtained SCSI-FCP information.

This command can be used to configure only one combination of FC4-Type and Feature at a time.

Examples

Configure the default FC4 information for the node with WWN 00:00:00:11:22:33:44:55.

```
<Sysname> system-view
[Sysname] fc wwn 00:00:00:11:22:33:44:55 default-fc4-type scsi-fcp feature target
[Sysname] fc wwn 00:00:00:11:22:33:44:55 default-fc4-type 9 feature 7
```

priority

Use **priority** to specify a priority for the switch in a specified VSAN.

Use **undo priority** to restore the default.

Syntax

priority *value*

undo priority

Default

The priority of a switch is 128 in each VSAN.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the priority of the switch, in the range of 1 to 254.

Usage guidelines

The priority value for FCF switches is in the range of 1 to 254. The smaller the value, the higher the priority. The FCF switch with the highest priority will become the principal switch.

The priority is configured on a per-VSAN basis, and one FCF switch may have different priorities in different VSANs.

The priority configuration for the switch does not take effect until a disruptive reconfiguration is performed by using the **domain restart disruptive** command.

Examples

Specify the priority as 64 for the switch in VSAN 1.

```
<Sysname> system-view
```

```
[Sysname] vsan 1
[Sysname-vsan1] priority 64
```

Related commands

domain restart

rscn aggregation enable

Use **rscn aggregation enable** to enable RSCN aggregation.

Use **undo rscn aggregation enable** to restore the default.

Syntax

rscn aggregation enable

undo rscn aggregation enable

Default

RSCN aggregation is disabled.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

For multiple change events occurring within the RSCN aggregation timer, RSCN aggregation allows the switch to put the FC addressees of multiple nodes with changes in a single RSCN. This reduces the number of RSCNs sent to the concerned registered nodes.

HP recommends that you enable RSCN aggregation and set the same timer value on all switches in a VSAN.

Examples

\# Enable RSCN aggregation in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] rscn aggregation enable
```

Related commands

rscn aggregation timer

rscn aggregation timer

Use **rscn aggregation timer** to set the RSCN aggregation timer.

Use **undo rscn aggregation timer** to restore the default.

Syntax

rscn aggregation timer *time*

undo rscn aggregation timer

Default

The RSCN aggregation timer is 2000 ms.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

time: Specifies a value for the RSCN aggregation timer, in the range of 100 to 2000 ms.

Usage guidelines

The RSCN aggregation timer takes effect only when RSCN aggregation is enabled.

HP recommends that you enable RSCN aggregation and set the same timer value on all switches in a VSAN.

Examples

\# Set the RSCN aggregation timer of VSAN 1 to 2000 ms.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] rscn aggregation enable
```

Related commands

rscn aggregation enable

timer distributed-services

Use **timer distributed-services** to specify the distributed service timeout period for a specified VSAN.

Use **undo timer distributed-services** to restore the default.

Syntax

timer distributed-services *value*

undo timer distributed-services

Default

The distributed service timeout period is 5000 milliseconds.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the distributed service timeout period in the range of 5000 to 10000 milliseconds.

Usage guidelines

The distributed service timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the distributed service timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the distributed service timeout period to 6000 milliseconds for VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] timer distributed-services 6000
```

Related commands

fc timer distributed-services

timer error-detect

Use **timer error-detect** to specify the error detection timeout period for a specified VSAN.

Use **undo timer error-detect** to restore the default.

Syntax

timer error-detect *value*

undo timer error-detect

Default

The error detection timeout period is 2000 milliseconds.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the error detection timeout period in the range of 1000 to 10000 milliseconds.

Usage guidelines

The error detection timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the error detection timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the error detection timeout period to 6000 milliseconds for VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
```

```
[Sysname-vsan1] timer error-detect 6000
```

Related commands

fc timer error-detect

timer resource-allocation

Use **timer resource-allocation** to specify the resource allocation timeout period for a specified VSAN.

Use **undo timer resource-allocation** to restore the default.

Syntax

timer resource-allocation *value*

undo timer resource-allocation

Default

The resource allocation timeout period is 10000 milliseconds.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the resource allocation timeout period in the range of 5000 to 10000 milliseconds.

Usage guidelines

The resource allocation timeout period can be configured in system view or VSAN view:

- The configuration made in system view takes effect on all VSANs. The configuration made in VSAN view takes effect only on the current VSAN.
- If you configure the resource allocation timeout period globally and for the specified VSAN at the same time, the configuration for the VSAN is given priority.

Examples

Set the resource allocation timeout period to 6000 milliseconds for VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] timer resource-allocation 6000
```

Related commands

fc timer resource-allocation

wwn area-port-id

Use **wwn area-port-id** to bind the WWN of an N_Port to an FC address in a specified VSAN.

Use **undo wwn area-port-id** to remove the specified binding.

Syntax

wwn *wwn-value* **area-port-id** *area-port-id-value*

undo wwn *wwn-value* **area-port-id**

Default

No binding is configured.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

wwn-value: Specifies the WWN of the N_Port, in the format of xx:xx:xx:xx:xx:xx:xx:xx, where x is a hexadecimal number.

area-port-id-value: Specifies the Area_ID and Port_ID in the format of xxxx, where x is a hexadecimal number. The first two digits indicate the Area_ID, and the last two digits indicate the Port_ID.

Usage guidelines

If you bind the WWN of an N_Port to an FC address, when the N_Port requests an FC address, the switch assigns the bound FC address to it. However, if the N_Port has been assigned another FC address or the FC address has been assigned to another N_Port, the binding is not allowed.

The N-Port here indicates an N_Port on a node or an NP_Port on an NPV switch.

The WWN of an N_Port can be bound to only one FC address, and vice versa.

Examples

In VSAN 1, bind the N_Port (whose WWN is 33:e8:00:05:30:00:16:df) to an FC address whose Area_ID is **ab** and Port_ID is 12.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] wwn 33:e8:00:05:30:00:16:df area-port-id ab12
```

VSAN commands

display vsan port-member

Use **display vsan port-member** to display the member interfaces of a specified VSAN.

display vsan [*vsan-id*] **port-member**

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan-id: Specifies a VSAN by its ID in the range of 1 to 3839. If you do not specify this argument, this command displays the member interfaces of all VSANs.

Examples

Display the member interfaces of all VSANs.
```
<Sysname> display vsan port-member
VSAN 1:
  Access Ports:
  Trunk Ports:
    Vfc2

VSAN 2:
  Access Ports:
  Trunk Ports:
    Vfc4

VSAN 10:
  Access Ports:
  Trunk Ports:

VSAN 100:
  Access Ports:
  Trunk Ports:
    Vfc4             Vfc5             Vfc6
```

port trunk vsan

Use **port trunk vsan** to assign an interface to the specified VSANs as a trunk port, so that the port allows the specified VSANs to pass through.

Use **undo port trunk vsan** to remove an interface from the specified VSANs.

Syntax

port trunk vsan *vsan-id-list*

undo port trunk vsan *vsan-id-list*

Default

A VFC interface is not assigned to any VSAN as a trunk port.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan-id-list: Specifies a list of VSANs, in the format of *vsan-id-list* = { *vsan-id1* [**to** *vsan-id2*] }&<1-10>, where *vsan-id* is in the range of 1 to 3839 and &<1-10> indicates that you can specify up to 10 *vsan-id1* [**to** *vsan-id2*] parameters.

Examples

Assign interface VFC 1 to VSANs 1, 2, 10, and 20 through 100.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] port trunk vsan 1 to 2 10 20 to 100
```

vsan

Use **vsan** to create a VSAN and enter VSAN view. If the VSAN already exists, you directly enter VSAN view.

Use **undo vsan** to delete a VSAN.

Syntax

vsan *vsan-id*

undo vsan *vsan-id*

Default

Only the default VSAN (VSAN 1) exists.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

You cannot create or delete VSAN 1, because it is the system-default VSAN. You can create VSANs 2 to 3839.

Examples

Create VSAN 10 and enter its view.

```
<Sysname> system-view
[Sysname] vsan 10
[Sysname-vsan10]
```

FC routing and forwarding commands

display fc exchange

Use **display fc exchange** to display the FC exchange entries.

In standalone mode:

display fc exchange { **link** | **protocol** } [**slot** *slot-number*]

display fc exchange link verbose [**slot** *slot-number*] [**exid** *exid*]

In IRF mode:

display fc exchange { **link** | **protocol** } [**chassis** *chassis-number* **slot** *slot-number*]

display fc exchange link verbose [**chassis** *chassis-number* **slot** *slot-number*] [**exid** *exid*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

link: Displays link exchange entries.

protocol: Displays protocol exchange entries.

verbose: Displays detailed information about link exchange entries.

exid *exid*: Displays link exchange entries for a specified exchange ID in the range of 0 to 65534. If no exchange ID is specified, this command displays all link exchange entries.

slot *slot-number*: Specifies a card by its slot number. If no card is specified, this command displays exchange entries for the MPU. (In standalone mode.)

chassis *chassis-number* **slot** *slot-number*: Specifies a card on a specified IRF member device. The *chassis-number* argument indicates the device number in the IRF fabric, and the *slot-number* argument indicates the slot number of the card. If you do not specify this option, this command displays exchange entries for the global active MPU. (In IRF mode.)

Usage guidelines

The exchange is a basic concept of FC. All data frames and control frames are transmitted based on the exchange. An exchange indicates one data exchange between communication entities and can consist of multiple bidirectional packet exchanges.

An exchange pair (initiating exchange and responding exchange) must be created for each data exchange. Service classes that provide reliable transmission services (classes 1, 2, and 6) perform packet acknowledgement, error detection, and packet retransmission based on the exchange pair.

Exchanges are divided into the following categories:

- **Protocol exchange**—Created only at the server end based on the protocol number and VSAN ID and used for monitoring connection setup.
- **Link exchange**—Created at both ends based on the exchange ID and used for packet exchange.

Examples

(In standalone mode.) Display the protocol exchange entries.

```
<Sysname> display fc exchange protocol slot 1
 Local_ID:EXID     Remote_ID:EXID     State       Slot   Protocol
 0x000000:65535    0x000000:65535     LISTEN      1      6
```

(In IRF mode.) Display the protocol exchange entries.

```
<Sysname> display fc exchange protocol chassis 1 slot 2
 Local_ID:EXID     Remote_ID:EXID     State       Chassis Slot   Protocol
 0x000000:65535    0x000000:65535     LISTEN      1       2      13
```

(In standalone mode.) Display the link exchange entries.

```
<Sysname> display fc exchange link slot 2
 Local_ID:EXID     Remote_ID:EXID     State       Slot   Protocol
 0x060501:1024     0x010001:1025      ESTABLISHED 2      8
```

(In IRF mode.) Display the link exchange entries.

```
<Sysname> display fc exchange link chassis 3 slot 5
 Local_ID:EXID     Remote_ID:EXID     State       Chassis Slot   Protocol
 0x060501:1024     0x010001:1025      ESTABLISHED 3       5      11
```

Display detailed information about the link exchange entries.

```
<Sysname> display fc exchange link verbose slot 1
 slot: 1
 protocol: 8
 connection info: Local = 0x090801:1155 ,  Remote = 0x050001:1089
 PCB flags: 0x2
 FC Class: FC_CLASS_F
 connection state: ESTABLISHED
 VSAN ID: 25
```

Table 17 Command output

Field	Description
Local_ID:EXID/Local	FC address and exchange ID of the local end This field is ignored for a protocol exchange.
Remote_ID:EXID/Remote	FC address and exchange ID of the peer end. This field is ignored for a protocol exchange.

Field	Description
State/connection state	Connection state of the FC exchange: • **PREPARE**—The protocol exchange is successfully bound, or the link exchange is waiting for the response packet. • **LISTEN**—The protocol exchange is monitoring the connection. • **ESTABLISHED**—The connection has been established. • **ABTS**—An ABTS was sent due to a connection timeout or error, and the ABTS ACK is being expected. • **BA_ACC**—An ABTS was received, an BA_ACC is replied, and an ACC ACK is being expected. • **ABTS_ACK**—An ABTS ACK was received, and a BA_ACC is being expected. • **CLOSED**—The connection is closed.
Slot/slot	Card where the FC exchange is created.
Protocol/protocol	FC protocol number.
PCB flags	FC exchange state flags: • **0x1**—The value 0 indicates the sending end, and 1 indicates the replying end. • **0x2**—The value 0 means there is no initiative, and 1 means there is initiative. • **0x4**—The value 1 indicates the first packet of the exchange. • **0x8**—The value 1 indicates that the exchange is waiting to be aged.
FC Class	FC connection service level (FC_CLASS_3 requires no ACK): • FC_CLASS_1. • FC_CLASS_2. • FC_CLASS_3. • FC_CLASS_F. • FC_CLASS_6.

display fc fib

Use **display fc fib** to display the FC FIB entries.

Syntax

display fc fib [*fcid* [*mask-length*]] **vsan** *vsan-id*

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

fcid: Specifies a destination FC address in the range of 0x000000 to 0xFFFFFF (hexadecimal).

mask-length: Specifies a mask length for the destination address, in the range of 0 to 24.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 4095.

Usage guidelines

The switch looks up the VSAN ID and FC address in the FC FIB for the outgoing interface.

If you specify both the *fcid* and *mask-length* arguments, this command displays FC FIB entries for the specified FC address and mask length.

If you specify the *fcid* argument but not the *mask-length* argument, this command displays FC FIB entries for the specified FC address according to the longest matching rule.

If you do not specify the *fcid* argument or the *mask-length* argument, this command displays all FC FIB entries.

Examples

Display all the FC FIB entries in VSAN 18.

```
<Sysname> display fc fib vsan 18
FC FIB information in VSAN 18:
  Destination count: 6
  FIB entry count: 7

  Destination/Mask          Interface
  0x030100/16               Vfc1
  0x030100/16               Vfc2
  0x030100/20               Vfc3
  0xfffc01/24               InLoop0
  0xfffffa/24               InLoop0
  0xfffffc/24               InLoop0
  0xfffffd/24               InLoop0
```

Display the FC FIB entries for a specific FC address according to the longest matching rule.

```
<Sysname> display fc fib 030100 vsan 18
FC FIB information in VSAN 18:
  Destination count: 1
  FIB entry count: 1

  Destination/Mask          Interface
  0x030100/20               Vfc3
```

Display the FC FIB entries for the specified FC address and mask length.

```
<Sysname> display fc fib 030100 16 vsan 18
FC FIB information in VSAN 18:
  Destination count: 1
  FIB entry count: 2

  Destination/Mask          Interface
  0x030100/16               Vfc1
  0x030100/16               Vfc2
```

Table 18 Command output

Field	Description
Destination count	Number of destination addresses.
FIB entry count	Number of FIB entries, including equal-cost routes.
Destination/Mask	Destination address/mask length.
Interface	Outgoing interface.

display fc routing-table

Use **display fc routing-table** to display the FC routing table.

Syntax

display fc routing-table [**vsan** *vsan-id*] [**statistics** | **verbose**]

display fc routing-table vsan *vsan-id fcid* [*mask* | *mask-length*] [**verbose**]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 4095. If no VSAN is specified, this command displays routing information of all VSANs.

fcid: Specifies the destination FC address for static FC routes, in the range of 0x010000 to 0xFFFFFF (hexadecimal).

mask: Specifies a hexadecimal mask of the FC address. This argument is used together with the *fcid* argument. The value of this argument can be 0xFF0000, 0xFFFF00, or 0xFFFFFF. If you do not specify this argument, this command displays the routing information for the FC address *fcid* with masks 0xFF0000, 0xFFFF00, and 0xFFFFFF.

mask-length: Specifies a decimal mask of the FC address. This argument is used together with the *fcid* argument. The value of this argument can be 8, 16, or 24. If you do not specify this argument, this command displays the routing information for the FC address *fcid* with masks 8, 16, and 24.

statistics: Displays the statistics for the FC routing table.

verbose: Displays detailed information about the FC routing table.

Usage guidelines

The routing table stores routes discovered by various routing protocols. You can use this command to display brief information, detailed information, and statistics about the routing table.

If you specify neither **statistics** nor **verbose**, this command displays brief information about the FC routing table.

The brief information contains information about only active routes. The detailed information contains information about both active and inactive routes.

Examples

Display brief information about all the routes in VSAN 5.

```
<Sysname> display fc routing-table vsan 5
Routing Table: VSAN 5
  Destinations : 5          Routes : 8
  Destination/mask    Protocol    Preference    Cost      Interface
  0x040000/8          FSPF        20            100       Vfc10
  0x040000/8          FSPF        20            100       Vfc20
  0x040000/8          FSPF        20            100       Vfc30
  0x040000/8          FSPF        20            100       Vfc40
  0xfffc01/24         DIRECT      0             0         InLoop0
  0xfffffa/24         DIRECT      0             0         InLoop0
  0xfffffc/24         DIRECT      0             0         InLoop0
  0xfffffd/24         DIRECT      0             0         InLoop0
```

Display detailed information about all the routes in VSAN 5.

```
<Sysname> display fc routing-table vsan 5 verbose
Routing Table: VSAN 5
  Destinations : 5          Routes : 5

  Destination/mask: 0x120000/8
         Protocol: STATIC
       Preference: 10
             Cost: 0
        Interface: Vfc1
            State: Active
              Age: 0h21m36s

  Destination/mask: 0xfffc01/24
         Protocol: DIRECT
       Preference: 0
             Cost: 0
        Interface: InLoop0
            State: Active
              Age: 0h21m36s

  Destination/mask: 0xfffffa/24
         Protocol: DIRECT
       Preference: 0
             Cost: 0
        Interface: InLoop0
            State: Active
              Age: 0h21m36s

  Destination/mask: 0xfffffc/24
         Protocol: DIRECT
```

```
       Preference: 0
             Cost: 0
        Interface: InLoop0
            State: Active
              Age: 0h21m36s


 Destination/mask: 0xfffffd/24
         Protocol: DIRECT
       Preference: 0
             Cost: 0
        Interface: InLoop0
            State: Active
              Age: 0h21m36s
```

Table 19 Command output

Field	Description
VSAN	VSAN number.
Destination/mask	FC address/mask.
Protocol	Protocol type: • **DIRECT**—Direct routes. • **STATIC**—Static routes. • **FSPF**—FSPF routes.
Preference	Route preference.
Cost	Route cost.
Interface	Outgoing interface.
State	Route state: Active or Inactive.
Age	Lifetime of the route in the routing table, in the format of XXhXXmXXs.

Display the statistics for all the routes in VSAN 5.

```
<Sysname> display fc routing-table vsan 5 statistics
Routing Table: VSAN 5
  Protocol   route       active       added       deleted
  DIRECT     4           4            4           0
  STATIC     1           1            1           0
  FSPF       0           0            0           0
  Total      5           5            5           0
```

Table 20 Command output

Field	Description
VSAN	VSAN number.
Protocol	Protocol type: • **DIRECT**—Direct routes. • **STATIC**—Static routes. • **FSPF**—FSPF routes.

Field	Description
route	Number of routes of the specified protocol type.
active	Number of active routes of the specified protocol type.
added	Number of added routes of the specified protocol type.
deleted	Number of deleted routes of the specified protocol type.
Total	Total number of routes.

Related commands

fc route-static

display fspf graceful-restart

Use **display fspf graceful-restart** to display FSPF GR status information.

Syntax

display fspf graceful-restart [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays FSPF GR status information for all VSANs.

Usage guidelines

Use this command to display FSPF GR status information, including whether GR restarter is enabled, whether GR helper is enabled, number of GR restarters being restarted, and number of GR helpers assisting in restarting the local device.

Examples

Display FSPF GR status information.

```
<Sysname> display fspf graceful-restart
Graceful-restart capability    : Disable
Helper capability              : Enable
Graceful-restart period        : 120 seconds

FSPF graceful restart information of VSAN 1:
  Number of neighbors under helper : 0
  Number of restarting neighbors   : 0

FSPF graceful restart information of VSAN 2:
```

```
  Number of neighbors under helper : 0
  Number of restarting neighbors   : 0
```

Table 21 Command output

Field	Description
Graceful-restart capability	Indicates whether GR restarter capability is enabled: Enable or Disable.
Helper capability	Indicates whether GR helper capability is enabled: Enable or Disable.
Number of neighbors under helper	Number of neighbors acting as GR helpers.
Number of restarting neighbors	Number of neighbors acting as GR restarters.

Related commands

- **fspf graceful-restart**
- **fspf graceful-restart helper**
- **fspf graceful-restart interval**

display fspf lsdb

Use **display fspf lsdb** to display FSPF link state database (LSDB) information.

Syntax

display fspf lsdb [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays LSDB information for all VSANs.

Usage guidelines

Use this command to display FSPF LSDB information, including the total number of link state records (LSRs) and specific information about each LSR.

Examples

Display FSPF LSDB information.
```
<Sysname> display fspf lsdb
FSPF LSDB information of VSAN 1(01):
  Total LSR count: 2
    FSPF Link State Database for Domain 01
```

```
     LSR Type                : 1
     LSR Age                 : 0
     LSR Incarnation number  : 0x80000008
     LSR Checksum            : 0x7deb
     Number of links         : 1
     NbrDomainID    IfIndex    NbrIfIndex    LinkType    Cost
     ----------------------------------------------------------
     2              0x68       0x68          1           265
   FSPF Link State Database for Domain 02
     LSR Type                : 1
     LSR Age                 : 6
     LSR Incarnation number  : 0x80000008
     LSR Checksum            : 0x7dea
     Number of links         : 1
     NbrDomainID    IfIndex    NbrIfIndex    LinkType    Cost
     ----------------------------------------------------------
     1              0x68       0x68          1           265
```

Table 22 Command output

Field	Description
FSPF LSDB information of VSAN	LSDB information for a specified VSAN. The value in parentheses is the domain ID in decimal of the local switch.
FSPF Link State Database for Domain	LSDB information for a specified domain ID (switch).
LSR Type	LSR type, which can only be Switch Link Record (0x01).
LSR Incarnation number	LSR instance number.
NbrDomainID	Neighbor domain ID.
IfIndex	Outgoing interface index of the local switch.
NbrIfIndex	Neighbor interface index.
Link Type	Link type: • **0x01**—Point-to-point. • **0xF0-FF**—Vendor-defined.
Cost	Link cost.

display fspf neighbor

Use **display fspf neighbor** to display FSPF neighbor information.

Syntax

display fspf neighbor [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays information about all FSPF neighbors.

Usage guidelines

Use this command to display FSPF neighbor information, including the neighbor domain ID, neighbor interface index, outgoing interface index of the local switch, remaining dead interval of the neighbor, and neighbor state.

Examples

Display FSPF neighbor information.

```
<Sysname> display fspf neighbor
FSPF neighbor information of VSAN 1(01):
  Interface    NbrDomain    IfIndex    NbrIfIndex    Dead Time    State
  Vfc1         2            0x68       0x68          00:01:06     Full
```

Table 23 Command output

Field	Description
FSPF neighbor information of VSAN	FSPF neighbor information for a specified VSAN. The value in parentheses is the domain ID in decimal of the local switch.
Interface	Interface name of the local switch.
NbrDomain	Neighbor domain ID in decimal.
IfIndex	Outgoing interface index of the local switch.
NbrIfIndex	Neighbor interface index.
Dead Time	Remaining dead interval of the neighbor. If no hello packet is received from the neighbor after this interval, the neighbor state changes to **Init**.
State	Neighbor state: • **Down**—The neighbor does not start negotiation. • **Init**—The neighbor has started negotiation. • **DB_Exchange**—The neighbor has been discovered. • **DB_Wait**—The local switch has sent the LSR. • **DB_Ack_Wait**—The neighbor has sent the LSR. • **Full**—Synchronization is complete.

display fspf statistics

Use **display fspf statistics** to display FSPF statistics.

Syntax

display fspf statistics [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the FSPF statistics for all VSANs.

Usage guidelines

You can use this command to display all FSPF statistics, consisting of global statistics and interface statistics. Global statistics consist of the current number of SPF calculations, number of error packets, total number of packets received and sent. Interface statistics consist of the total number of packets received and sent on each interface.

Examples

Display FSPF statistics.

```
<Sysname> display fspf statistics
FSPF statistics of VSAN 1(01):
  SPF computing count: 6
  Statistics counters:
    Bad packet       : 0      Neighbor unknown   : 0
    Timer mismatch   : 0      Neighbor state low : 0
    Bad LSR          : 0
  Packet statistics:
    Type            Input          Output
    HELLO           50             50
    LSU             5              5
    LSA             4              4
  Interface Vfc1 statistics:
    Type            Input          Output
    HELLO           50             50
    LSU             5              5
    LSA             4              4
```

Table 24 Command output

Field	Description
FSPF statistics of VSAN	FSPF statistics for a specified VSAN. The value in parentheses is the domain ID in decimal of the local switch.
SPF computing count	Number of SPF calculations.
Interface statistics	Packet statistics on the interface.
Bad packet	Number of error packets.

Field	Description
Timer mismatch	Number of packets whose hello or dead interval does not match that of the neighbor.
Bad LSR	Number of error LSRs.
Neighbor unknown	Number of packets received from unknown neighbors.
Neighbor state low	Number of LSUs and LSAs received in Init state.
Type	Packet type: Hello, LSU, or LSA.
Input	Number of packets received.
Output	Number of packets sent.

Related commands

reset fspf counters

fc route-static

Use **fc route-static** to configure a static FC route.

Use **undo fc route-static** to delete a static FC route.

Syntax

fc route-static *fcid* { *mask* | *mask-length* } *interface-type interface-number* [**cost** *cost-value*]

undo fc route-static *fcid* { *mask* | *mask-length* } *interface-type interface-number*

Default

No static FC route exists.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

fcid: Specifies the destination FC address of the static FC route, in the range of 0x010000 to 0xFFFFFF (hexadecimal).

mask: Specifies a hexadecimal mask of the FC address. This argument is used together with the *fcid* argument. The value of this argument can be 0xFF0000, 0xFFFF00, or 0xFFFFFF.

mask-length: Specifies a decimal mask of the FC address. This argument is used together with the *fcid* argument. The value of this argument can be 8, 16, or 24.

interface-type interface-number: Specifies the outgoing interface of the static FC route, which must be an existing VFC interface on the FCF switch.

cost *cost-value*: Specifies the cost of the route, in the range of 0 to 65535 and defaulting to 0.

Usage guidelines

Static routes are routes that are manually configured by an administrator. After an administrator configures a static route, an FC frame to the specified destination is forwarded along the static route.

In a simple network, static routes are enough for implementing network connectivity. When the network fails or the network topology changes, you must manually modify the static routes.

Static routes support equal-cost routes. When you configure multiple equal-cost static routes to the same destination but with different outgoing interfaces, equal-cost routes are generated.

Examples

Add a static FC route, whose destination FC address is 0x010000, mask is 8, outgoing interface is VFC 4, and cost is 20.

```
<Sysname> system-view
[Sysname] vsan 5
[Sysname-vsan5] fc route-static 010000 8 vfc 4 cost 20
```

Related commands

display fc routing-table

fspf cost

Use **fspf cost** to configure the FSPF cost for the interface in a specified VSAN.

Use **undo fspf cost** to restore the default.

Syntax

fspf cost *value* **vsan** *vsan-id*

undo fspf cost vsan *vsan-id*

Default

The FSPF cost for VFC interfaces is 100.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the FSPF cost of the interface, in the range of 1 to 65535.

vsan *vsan-id*: Specifies the VSAN to which the interface belongs, in the range of 1 to 3839.

Usage guidelines

Each link has a different cost. The route selection algorithm uses this value to determine the best route. The smaller the interface FSPF cost, the smaller the link cost.

Examples

Configure the FSPF cost of interface VFC 1 in VSAN 4 as 1000.

```
<Sysname> system-view
[Sysname] interface vfc 1
```

```
[Sysname-Vfc1] fspf cost 1000 vsan 4
```

fspf dead-interval

Use **fspf dead-interval** to configure the dead interval for the interface in a specified VSAN.

Use **undo fspf dead-interval** to restore the default.

Syntax

fspf dead-interval *value* **vsan** *vsan-id*

undo fspf dead-interval vsan *vsan-id*

Default

The default setting is 80 seconds.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the dead interval of the interface in seconds, in the range of 2 to 65535.

vsan *vsan-id*: Specifies the VSAN to which the interface belongs, in the range of 1 to 3839.

Usage guidelines

After two switches establish a neighbor relationship, they send hello packets at the hello interval to each other to maintain the neighbor relationship. The dead interval specifies the interval during which at least one hello packet must be received from a neighbor before the neighbor is considered to be nonexistent and is removed.

The configured dead interval must be greater than the hello interval and must be the same at the two ends of the link.

Examples

Configure the dead interval for interface VFC 1 in VSAN 4 as 100 seconds.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fspf dead-interval 100 vsan 4
```

Related commands

fspf hello-interval

fspf enable

Use **fspf enable** to enable FSPF for a specified VSAN.

Use **undo fspf enable** to disable FSPF for a specified VSAN.

Syntax

fspf enable

undo fspf enable

Default

FSPF is enabled after a VSAN is created.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

FSPF-related functions work in a VSAN only after you enable FSPF for the VSAN.

Examples

Enable FSPF for VSAN 4.

```
<Sysname> system-view
[Sysname] vsan 4
[Sysname-vsan4] fspf enable
```

fspf graceful-restart

Use **fspf graceful-restart** to enable FSPF GR.

Use **undo fspf graceful-restart** to disable FSPF GR.

Syntax

fspf graceful-restart

undo fspf graceful-restart

Default

FSPF GR is disabled.

Views

System view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

FSPF Graceful Restart (GR) ensures nonstop forwarding of traffic by backing up FSPF configuration information during a protocol restart (for example, the FSPF process restart triggered by the **process** command) or active/standby switchover.

GR involves the following roles:

- **GR restarter**—GR-capable device where a protocol restart or active/standby switchover occurs
- **GR helper**—The GR restarter's neighboring device that assists in the GR process

Examples

Enable FSPF GR.

```
<Sysname> system-view
[Sysname] fspf graceful-restart
```

Related commands

- **display fspf graceful-restart**
- **fspf graceful-restart helper**

fspf graceful-restart helper

Use **fspf graceful-restart helper** to enable FSPF GR helper.

Use **undo fspf graceful-restart helper** to disable FSPF GR helper.

Syntax

fspf graceful-restart helper

undo fspf graceful-restart helper

Default

FSPF GR helper is enabled.

Views

System view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

The switch can assist the GR restarter in completing the GR process only after being enabled with FSPF GR helper.

Examples

Enable FSPF GR helper.

```
<Sysname> system-view
[Sysname] fspf graceful-restart helper
```

Related commands

- **display fspf graceful-restart**
- **fspf graceful-restart**

fspf graceful-restart interval

Use **fspf graceful-restart interval** to configure the maximum interval for FSPF GR.

Use **undo fspf graceful-restart interval** to restore the default.

Syntax

fspf graceful-restart interval *interval-value*

undo fspf graceful-restart interval

Default

The default setting is 120 seconds.

Views

System view

Predefined user roles

network-admin

mdc-admin

Parameters

interval-value: Specifies the maximum interval for FSPF GR in seconds, in the range of 40 to 1800.

Usage guidelines

If the GR restarter fails to complete the GR process within the maximum interval, it immediately exits the GR process.

Examples

Configure the maximum interval for FSPF GR as 100 seconds.

```
<Sysname> system-view
[Sysname] fspf graceful-restart interval 100
```

Related commands

display fspf graceful-restart

fspf hello-interval

Use **fspf hello-interval** to configure the hello interval for a VFC interface in a specified VSAN.

Use **undo fspf hello-interval** to restore the default.

Syntax

fspf hello-interval *value* **vsan** *vsan-id*

undo fspf hello-interval vsan *vsan-id*

Default

The hello interval for a VFC interface is 20 seconds.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the Hello interval in the range of 1 to 65534 seconds.

vsan *vsan-id*: Specifies the VSAN to which the interface belongs, in the range of 1 to 3839.

Usage guidelines

The hello interval specifies the time between the hello packets sent periodically by the switch to discover and maintain neighbor relationships.

The configured hello interval must be smaller than the dead interval and must be the same at the two ends of the link.

Examples

\# Configure the hello interval for interface VFC 1 in VSAN 4 as 10 seconds.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fspf hello-interval 10 vsan 4
```

Related commands

fspf dead-interval

fspf min-ls-arrival

Use **fspf min-ls-arrival** to configure the minimum LSR receiving interval for a specified VSAN.

Use **undo fspf min-ls-arrival** to restore the default.

Syntax

fspf min-ls-arrival *value*

undo fspf min-ls-arrival

Default

The default setting is 1 second.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the minimum LSR receiving interval in the range of 0 to 60 seconds.

Usage guidelines

The minimum LSR receiving interval specifies the time between receiving LSRs in a VSAN. Any LSR instances of the same LSR received within this time are dropped. This helps avoid frequent SPF calculations caused by LSDB updating.

Examples

\# Configure the minimum LSR receiving interval as 10 seconds for VSAN 2.

```
<Sysname> system-view
[Sysname] vsan 2
[Sysname-vsan2] fspf min-ls-arrival 10
```

fspf min-ls-interval

Use **fspf min-ls-interval** to configure the minimum LSR refresh interval for a specified VSAN.

Use **undo fspf min-ls-interval** to restore the default.

Syntax

fspf min-ls-interval *value*

undo fspf min-ls-interval

Default

The default setting is 5 seconds.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the minimum LSR refresh interval in the range of 1 to 60 seconds.

Usage guidelines

The minimum LSR refresh interval specifies the interval at which LSRs are refreshed. To reduce SPF calculations and LSR flooding in a fabric caused by frequent LSR refreshing, the switch cannot refresh local LSRs within this interval.

Examples

Configure the minimum LSR refresh interval as 10 seconds for VSAN 2.

```
<Sysname> system-view
[Sysname] vsan 2
[Sysname-vsan2] fspf min-ls-interval 10
```

fspf retransmit-interval

Use **fspf retransmit-interval** to configure the LSR retransmission interval for the interface in a specified VSAN.

Use **undo fspf retransmit-interval** to restore the default.

Syntax

fspf retransmit-interval *value* **vsan** *vsan-id*

undo fspf retransmit-interval vsan *vsan-id*

Default

The default setting is 5 seconds.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the LSR retransmission interval of the interface in seconds, in the range of 1 to 65535.

vsan *vsan-id*: Specifies the VSAN to which the interface belongs, in the range of 1 to 3839.

Usage guidelines

The LSR retransmission interval specifies the time to wait for an LSR acknowledgement from the neighbor before retransmitting the LSR.

Examples

\# Configure the LSR retransmission interval for interface VFC 1 in VSAN 4 as 10 seconds.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fspf retransmit-interval 10 vsan 4
```

fspf silent

Use **fspf silent** to disable FSPF for the interface in a specified VSAN.

Use **undo fspf silent** to enable FSPF for the interface in a specified VSAN.

Syntax

fspf silent vsan *vsan-id*

undo fspf silent vsan *vsan-id*

Default

FSPF is enabled on all interfaces.

Views

VFC interface view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan *vsan-id*: Specifies the VSAN to which the interface belongs, in the range of 1 to 3839.

Usage guidelines

With FSPF enabled, an interface can participate in the SPF calculation. To avoid SPF calculations on an interface, disable FSPF on the interface.

Examples

\# Disable FSPF for interface VFC 1 in VSAN 4.

```
<Sysname> system-view
[Sysname] interface vfc 1
[Sysname-Vfc1] fspf silent vsan 4
```

fspf spf-hold-time

Use **fspf spf-hold-time** to configure the shortest SPF calculation interval in a specified VSAN.

Use **undo fspf spf-hold-time** to restore the default.

Syntax

fspf spf-hold-time *value*

undo fspf spf-hold-time

Default

The default setting is 0 seconds.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

value: Specifies the shortest SPF calculation interval in the range of 0 to 60 seconds.

Usage guidelines

When the LSDB changes, SPF calculations occur, which consume CPU resources. To prevent frequent SPF calculations from consuming too many CPU resources, you can configure the shortest SPF calculation interval.

The shortest SPF calculation interval defines the minimum interval between two consecutive SPF calculations. Setting a small value means that FSPF responds quickly to fabric changes by recalculating routes in a VSAN. A small value consumes more CPU resources.

Examples

Configure the shortest SPF calculation interval as 10 seconds in VSAN 2.

```
<Sysname> system-view
[Sysname] vsan 2
[Sysname-vsan2] fspf spf-hold-time 10
```

reset fspf counters

Use **reset fspf counters** to clear FSPF statistics.

Syntax

reset fspf counters [**vsan** *vsan-id*]

Views

User view

Predefined user roles

network-admin

mdc-admin

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command clears the FSPF statistics for all VSANs.

Examples

Clear FSPF statistics in VSAN 2.

```
<Sysname> reset fspf counters vsan 2
```

Related commands

display fspf statistics

FC zone commands

delete zone database all

Use **delete zone database all** to delete zone database information.

Syntax

delete zone database all

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

You can delete the zone database for the specified VSAN, including all zone sets, zones, and zone aliases, but not the active zone set.

Examples

Delete zone database information for VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] delete zone database all
This operation will delete all information of the zone database except active zone set.
Continue?[Y/N]:
```

display zone

Use **display zone** to display zone information.

Syntax

display zone [[**name** *zone-name*] **vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

name *zone-name*: Specifies a zone name, a case-sensitive string of 1 to 64 characters. A zone name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

If you specify both **name** *zone-name* and **vsan** *vsan-id*, this command displays information about a single zone in a specified VSAN.

If you specify only **vsan** *vsan-id*, this command displays information about all zones in the specified VSAN.

If you specify neither option, this command displays information about all zones in all VSANs.

Examples

Display information about all zones in all VSANs.

```
<Sysname> display zone
VSAN 1:
  zone name z1
    fcid 0x111111
    fcid 0x222222
    pwwn 11:11:11:11:22:22:22:22
  zone name z2
    fcid 0x111111
    zone-alias name za1
    fcid 0x333333
VSAN 2:
VSAN 3:
```

Table 25 Command output

Field	Description
VSAN	VSAN number.
fcid	FC address of the zone member.
pwwn	pWWN of the zone member.

Related commands

- **member** (zone view)
- **zone clone**
- **zone name**
- **zone rename**

display zone member

Use **display zone member** to display parent information for a specified zone member.

Syntax

display zone member { **fcid** *fcid* | **pwwn** *pwwn* | **zone-alias** *zone-alias-name* } [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

fcid *fcid*: Specifies a zone member by its FC address, in the format of xxxxxx, where x is a hexadecimal number.

pwwn *pwwn*: Specifies a zone member by its pWWN, in the format of xx:xx:xx:xx:xx:xx:xx:xx, where x is a hexadecimal number.

zone-alias *zone-alias-name*: Specifies a zone alias name, a case-sensitive string of 1 to 64 characters. A zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays parent information for zone members in all VSANs.

Usage guidelines

You can use this command to display parent information for zone members by specifying FC address, pWWN, or zone alias. Parent information consists of the zones and zone alias to which the zone member belongs and the zones to which the zone alias belongs.

Examples

Display parent information for zone member with FC address as 010000 in VSAN 1.

```
<Sysname> display zone member fcid 010000 vsan 1
fcid 0x010000
  VSAN 1:
    zone z1
    zone z2
    zone z3
    zone-alias a1
      zone z2
      zone z3
```

Display parent information for zone member with pWWN as 11:22:33:44:55:66:77:88 in all VSANs.

```
<Sysname> display zone member pwwn 11:22:33:44:55:66:77:88
pwwn 11:22:33:44:55:66:77:88
  VSAN 1:
    zone z1
    zone z2
    zone z3
    zone-alias a1
      zone z2
      zone z3
  VSAN 3:
    zone z1
```

Display parent information for zone member with zone alias name **za1** in VSAN 1.

```
<Sysname> display zone member zone-alias za1 vsan 1
zone-alias za1
  VSAN 1:
    zone z1
    zone z2
```

Table 26 Command output

Field	Description
VSAN	VSAN number.
fcid	FC address of the zone member for which parent information is displayed.
pwwn	pWWN of the zone member for which parent information is displayed.
zone-alias	Zone alias name.
zone	Zone name.

Related commands

- **member** (zone view)
- **member** (zone-alias view)

display zone status

Use **display zone status** to display configuration and running status of zones.

Syntax

display zone status [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays configuration and running status of zones in all VSANs.

Usage guidelines

You can use this command to display configuration and running status of zones, including zone mode, default zone policy, distribution and merge type, zone database information (numbers of existing zone sets, zones, and zone aliases), and zone status (being distributed or merged).

Examples

Display configuration and running status of zones in VSAN 1.

```
<Sysname> display zone status vsan 1
VSAN 1:
```

```
  Mode: basic
  Default zone: deny
  Distribute: active only
  Hard-zoning: enabled
  Full zoning database:
    Zonesets: 10, Zones: 20, Zone-aliases: 0
  Status: merging
```

Display configuration and running status of zones in all VSANs.

```
<Sysname> display zone status
VSAN 1:
  Mode: basic
  Default zone: deny
  Distribute: active only
  Hard-zoning: enabled
  Full zoning database:
    Zonesets: 10, Zones: 20, Zone-aliases: 0
  Status: merging
VSAN 2:
  Mode: basic
  Default zone: permit
  Distribute: full
  Hard-zoning: enabled
  Full zoning database:
    Zonesets: 10, Zones: 20, Zone-aliases: 0
  Status: distributing
```

Table 27 Command output

Field	Description
VSAN	VSAN number.
Mode	Zone mode: basic (supported) or enhanced.
Default zone	Default zone policy: • **deny**—Members in the default zone cannot access each other. • **permit**—Members in the default zone can access each other.
Distribute	Distribution and merge type: • **active only**—Incomplete distribution and merge. • **full**—Complete distribution and merge.
Hard-zoning	Indicates whether hard zoning is enabled or disabled. Zoning can be implemented in two ways: hard (zone filtering through hardware) and soft (zone filtering through software). Hard zoning has higher security and is used by default. Hard zoning enable state can be different in different VSANs. When hardware resources are insufficient, the system automatically disables hard zoning and enables soft zoning.
Full Zoning Database	Zone database information, including the numbers of zone sets, zones, and zone aliases in a specified VSAN.

Field	Description
Status	Zone status: • **merging**—Zone merge is in progress. • **distributing**—Zone distribution is in progress. • **database-changing**—Data update is in progress. • **Free**—Idle.

Related commands

- **zone default-zone permit**
- **zoneset distribute full**

display zone-alias

Use **display zone-alias** to display zone alias information.

Syntax

display zone-alias [[**name** *zone-alias-name*] **vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

name *zone-alias-name*: Specifies a zone alias name, a case-sensitive string of 1 to 64 characters. A zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

If you specify both **name** *zone-alias-name* and **vsan** *vsan-id*, this command displays information about a single zone alias in a specified VSAN.

If you specify only **vsan** *vsan-id*, this command displays information about all zone aliases in a specified VSAN.

If you specify neither option, this command displays information about all zone aliases in all VSANs.

Examples

Display information about all zone aliases in all VSANs.

```
<Sysname> display zone-alias
VSAN 1:
  zone-alias name za1
    fcid 0x111111
    fcid 0x222222
```

```
    pwwn 11:11:11:11:22:22:22:22
  zone-alias name za2
    fcid 0x111111
VSAN 2:
  zone-alias name za1
```

Table 28 Command output

Field	Description
VSAN	VSAN number.
fcid	FC address of the zone alias.
pwwn	pWWN of the zone alias.

Related commands

- **member** (zone-alias view)
- **zone-alias clone**
- **zone-alias name**
- **zone-alias rename**

display zoneset

Use **display zoneset** to display zone set information.

Syntax

display zoneset [[**name** *zoneset-name*] **vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

name *zoneset-name*: Specifies a zone set name, a case-sensitive string of 1 to 64 characters. A zone set name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

If you specify both **name** *zoneset-name* and **vsan** *vsan-id*, this command displays information about a single zone set in a specified VSAN.

If you specify only **vsan** *vsan-id*, this command displays information about all zone sets in a specified VSAN.

If you specify neither option, this command displays information about all zone sets in all VSANs.

Examples

Display information about all zone sets in all VSANs.

```
<Sysname> display zoneset
VSAN 1:
  zoneset name zs1
    zone name z1
      fcid 0x111111
      fcid 0x222222
      pwwn 11:11:11:11:22:22:22:22
    zone name z2
      fcid 0x111111
      zone-alias name za1
        fcid 0x111112
  zoneset name zs2
    zone name z1
VSAN 2:
VSAN 3:
  zoneset name zs1
    zone name z1
```

Table 29 Command output

Field	Description
VSAN	VSAN number.
fcid	FC address of a zone or a zone alias.
pwwn	pWWN of a zone or a zone alias.

Related commands

- **member** (zoneset view)
- **zoneset clone**
- **zoneset name**
- **zoneset rename**

display zoneset active

Use **display zoneset active** to display information about the active zone set.

Syntax

display zoneset active [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays information about active zone sets in all VSANs.

Usage guidelines

A VSAN can have only one active zone set.

The following rules apply to the command output:

- For an existing zone member, which can be queried from the local name service database, this command prefixes an asterisk (*) to the related line. If a pWWN is configured for the zone member, the device queries its associated FC address from the name service database and displays it, and appends the pWWN enclosed in brackets ([]) to the FC address.

- For a zone member that does not exist in the local name service database, only the configuration content is displayed.

- Zone members cannot be displayed by zone alias in the active zone set. If a zone in the activated zone set has members with a zone alias, the non-overlapping N_Port members in the zone alias are directly added to the zone.

- If members of the default zone are allowed to access each other, this command displays valid members in the default zone by FC address (members registered with the name service database and not part of the active zone set).

Examples

Display information about the active zone sets in all VSANs.

```
<Sysname> display zoneset active
  VSAN 1:
    zoneset name zs1
      zone name z1
        *fcid 0x111111 [pwwn 11:11:11:11:11:11:11:11]
        *fcid 0x222222
      zone name z2
        *fcid 0x111111 [pwwn 11:11:11:11:11:11:11:11]
        *fcid 0x333333 [pwwn 33:33:33:33:33:33:33:33]
        fcid 0x123456
        pwwn 11:11:11:11:11:11:11:12
  VSAN 2:
  VSAN 3:
    zoneset name zs1
      zone name z1
        *fcid 0x111111 [pwwn 11:11:11:11:11:11:11:11]
        *fcid 0x333333 [pwwn 33:33:33:33:33:33:33:33]
        fcid 0x123456
        pwwn 11:11:11:11:11:11:11:12
```

Display information about the active zone set in VSAN 1.

```
<Sysname> display zoneset active vsan 1
  VSAN 1:
    zoneset name zs1
      zone name z1
```

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```
      *fcid 0x111111 [pwwn 11:11:11:11:11:11:11:11]
      *fcid 0x222222
   zone name z2
      *fcid 0x111111 [pwwn 11:11:11:11:11:11:11:11]
      *fcid 0x333333 [pwwn 33:33:33:33:33:33:33:33]
      fcid 0x123456
      pwwn 11:11:11:11:11:11:11:12
   zone name #default_zone#
      *fcid 0xabcdef
      *fcid 0x20abcd
```

Table 30 Command output

Field	Description
VSAN	VSAN number.
*fcid	FC address of the zone member that can be queried from the local name service database.
fcid	FC address of the zone member that does not exist in the local name service database.
pwwn	Configured pWWN of the zone member.

Related commands

zoneset activate name

member (zone view)

Use **member** to add a member to a specified zone.

Use **undo member** to delete a member from a specified zone.

Syntax

member { **fcid** *fcid* | **pwwn** *pwwn* | **zone-alias** *zone-alias-name* }

undo member { **fcid** *fcid* | **pwwn** *pwwn* | **zone-alias** *zone-alias-name* }

Default

No member exists in a zone.

Views

Zone view

Predefined user roles

network-admin

mdc-admin

Parameters

fcid *fcid*: Specifies the FC address of the member, in the format of xxxxxx, where x is a hexadecimal number.

pwwn *pwwn*: Specifies the pWWN of the member, in the format of xx:xx:xx:xx:xx:xx:xx:xx, where x is a hexadecimal number.

zone-alias *zone-alias-name*: Specifies an existing zone alias, a case-sensitive string of 1 to 64 characters. A zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone **z1** and enter its view.
```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
[Sysname-vsan1-zone-z1]
```

Add an N_Port with the FC address as 010000 to z1.
```
[Sysname-vsan1-zone-z1] member fcid 010000
```

Add an N_Port with the pWWN as 01:02:03:04:05:06:07:08 to z1.
```
[Sysname-vsan1-zone-z1] member pwwn 01:02:03:04:05:06:07:08
```

Add zone alias **za1** (existing) to **z1**.
```
[Sysname-vsan1-zone-z1] member zone-alias za1
```

Related commands

- **display zone**
- **display zone member**
- **zone name**
- **zone-alias name**

member (zone-alias view)

Use **member** to add a member to a specified zone alias.

Use **undo member** to delete a member from a specified zone alias.

Syntax

member { **fcid** *fcid* | **pwwn** *pwwn* }

undo member { **fcid** *fcid* | **pwwn** *pwwn* }

Default

No member exists in a zone alias.

Views

Zone alias view

Predefined user roles

network-admin

mdc-admin

Parameters

fcid *fcid*: Specifies the FC address of the member, in the format of *xxxxxx*, where *x* is a hexadecimal number.

pwwn *pwwn*: Specifies the pWWN of the member, in the format of *xx:xx:xx:xx:xx:xx:xx:xx*, where *x* is a hexadecimal number.

Examples

Create zone alias **za1** and enter its view.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone-alias name za1
[Sysname-vsan1-zone-alias-za1]
```

Add an N_Port with the FC address as 010000 to zone alias **za1**.

```
[Sysname-vsan1-zone-alias-za1] member fcid 010000
```

Add an N_Port with the pWWN as 01:02:03:04:05:06:07:08 to zone alias **za1**.

```
[Sysname-vsan1-zone-alias-za1] member pwwn 01:02:03:04:05:06:07:08
```

Related commands

- **display zone-alias**
- **zone-alias name**

member (zone set view)

Use **member** to add a zone to a specified zone set.

Use **undo member** to delete a zone from a specified zone set.

Syntax

member *zone-name*

undo member *zone-name*

Default

No zone exists in a zone set.

Views

Zone set view

Predefined user roles

network-admin

mdc-admin

Parameters

zone-name: Specifies an existing zone, a case-sensitive string of 1 to 64 characters. A zone name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone **z1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
[Sysname-vsan1-zone-z1] quit
```

Create zone set **zs1** and enter its view.

```
[Sysname] zoneset name zs1
[Sysname-vsan1-zoneset-zs1]
```

Add zone **z1** to zone set **zs1**.

```
[Sysname-vsan1-zoneset-zs1] member z1
```

Related commands

- **display zoneset**
- **zone name**
- **zoneset name**

zone clone

Use **zone clone** to copy a zone.

Syntax

zone clone *src-name dest-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

src-name: Specifies the name of the source zone to be copied, a case-sensitive string of 1 to 64 characters. A source zone name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

dest-name: Specifies the name of the destination zone, a case-sensitive string of 1 to 64 characters. A destination zone name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone **z1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
[Sysname-vsan1-zone-z1] quit
```

Create zone **z2** by copying **z1**.

```
[Sysname-vsan1] zone clone z1 z2
```

Related commands

- **display zone**
- **zone name**

zone default-zone permit

Use **zone default-zone permit** to allow members in the default zone to access each other.

Use **zone default-zone permit** to prohibit members in the default zone from accessing each other.

Syntax

zone default-zone permit

undo zone default-zone permit

Default

Members in the default zone cannot access each other.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Examples

Allow members in the default zone to access each other.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone default-zone permit
```

Related commands

display zone status

zone name

Use **zone name** to create a zone and enter its view. If the zone has been created, enter its view directly.

Use **undo zone name** to delete a specified zone.

Syntax

zone name *zone-name*

undo zone name *zone-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

zone-name: Specifies a zone name, a case-sensitive string of 1 to 64 characters. A zone name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone **z1** and enter its view.
```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
[Sysname-vsan1-zone-z1]
```

Related commands

display zone

zone rename

Use **zone rename** to rename a zone.

Syntax

zone rename *old-name new-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

old-name: Specifies the name of the zone to be renamed, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

new-name: Specifies the new zone name, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone **z1**.
```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
[Sysname-vsan1-zone-z1] quit
```

Rename zone **z1** as **z2**.
```
[Sysname-vsan1] zone rename z1 z2
```

Related commands

- **display zone**
- **zone name**

zone-alias clone

Use **zone-alias clone** to copy a zone alias.

Syntax

zone-alias clone *src-name dest-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

src-name: Specifies the name of the source zone alias to be copied, a case-sensitive string of 1 to 64 characters. A source zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

dest-name: Specifies the name of the destination zone alias, a case-sensitive string of 1 to 64 characters. A destination zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone alias **za1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone-alias name za1
[Sysname-vsan1-zone-alias-za1] quit
```

Create zone alias **za2** by copying zone alias **za1**.

```
[Sysname-vsan1] zone-alias clone za1 za2
```

Related commands

- **display zone-alias**
- **zone-alias name**

zone-alias name

Use **zone-alias name** to create a zone alias and enter its view. If the zone alias has been created, enter its view directly.

Use **undo zone-alias name** to delete a specified zone alias.

Syntax

zone-alias name *zone-alias-name*

undo zone-alias name *zone-alias-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

zone-alias-name: Specifies the zone alias name, a case-sensitive string of 1 to 64 characters. A zone alias name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

\# Create zone alias **za1** and enter its view.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone-alias name za1
[Sysname-vsan1-zone-alias-za1]
```

Related commands

display zone-alias

zone-alias rename

Use **zone-alias rename** to rename a zone alias.

Syntax

zone-alias rename *old-name new-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

old-name: Specifies the name of the zone alias to be renamed, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

new-name: Specifies the new zone alias name, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

\# Create zone alias **za1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone-alias name za1
[Sysname-vsan1-zone-alias-za1] quit
```

\# Rename zone alias **za1** as **za2**.

```
[Sysname-vsan1] zone-alias rename za1 za2
```

Related commands

- **display zone-alias**
- **zone-alias name**

zoneset activate

Use **zoneset activate** to activate a specified zone set as the active zone set and distribute it to the entire fabric.

Use **undo zoneset activate** to delete an active zone set and distribute the deletion to the entire fabric.

Syntax

zoneset activate name *zoneset-name*

undo zoneset activate

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

name *zoneset-name*: Specifies the zone set to be activated by its name, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Usage guidelines

Each VSAN can have multiple zone sets, but only one zone set can be effective at a time. It is called the "active zone set." The active zone set must consist of at least one N_Port member and determines access control over N_Ports.

You must use this command to explicitly activate a zone set as the active zone set and distribute it to the entire fabric.

When distributing the active zone set to the entire fabric, the device determines whether to carry zone database information according to the distribution type specified by the **zoneset distribute full** command.

Examples

Create zone **z1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zone name z1
```

Add an N_Port with the FC address as 010000 to zone **z1**.

```
[Sysname-vsan1-zone-z1] member fcid 010000
[Sysname-vsan1-zone-z1] quit
```

Create zone set **zs1**.

```
[Sysname-vsan1] zoneset name zs1
```

Add zone **z1** to zone set **zs1**.

```
[Sysname-vsan1-zoneset-zs1] member z1
[Sysname-vsan1-zoneset-zs1] quit
```

Activate zone set **zs1**.

```
[Sysname-vsan1] zoneset activate name zs1
```

Related commands

- **display zoneset active**
- **zoneset distribute full**

zoneset clone

Use **zoneset clone** to create a zone set by copying an existing zone set.

Syntax

zoneset clone *src-name dest-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

src-name: Specifies the name of the source zone set to be copied, a case-sensitive string of 1 to 64 characters. A source zone set name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

dest-name: Specifies the name of the destination zone set, a case-sensitive string of 1 to 64 characters. A destination zone set name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone set **zs1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zoneset name zs1
[Sysname-vsan1-zoneset-zs1] quit
```

Create zone set **zs1** by copying zone set **zs2**.

```
[Sysname-vsan1] zoneset clone zs1 zs2
```

Related commands

- **display zoneset**
- **zoneset name**

zoneset distribute

Use **zoneset distribute** to trigger a complete distribution, distributing both the active zone set and zone database.

Syntax

zoneset distribute

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

After activating a zone set as the active zone set by using the **zoneset activate** command, you can modify the database configuration. With the **zoneset distribute** command, you can distribute the active zone set and the modified database to the entire fabric without changing the active zone set.

Examples

Trigger a complete distribution.
```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zoneset distribute
```

zoneset distribute full

Use **zoneset distribute full** to configure zone distribution and merge types as **complete distribution** and **complete merge**.

Use **undo zoneset distribute full** to restore the default.

Syntax

zoneset distribute full

undo zoneset distribute full

Default

The zone distribution and merge types are **incomplete distribution** and **incomplete merge**.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

Complete distribution (or merge) distributes (or merges) both the active zone set and zone database. Incomplete distribution (or merge) distributes (or merges) only the active zone set.

The configured distribution type applies to distribution operations triggered by the **zoneset activate** command instead of the **zoneset distribute** command.

The configured merge type applies to all merge operations.

Examples

Configure zone distribution and merge types as **complete distribution** and **complete merge**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zoneset distribute full
```

Related commands

- **display zone status**
- **zoneset activate**

zoneset name

Use **zoneset name** to create a zone set and enter its view. If the zone set has been created, enter its view directly.

Use **undo zoneset name** to delete a specified zone set.

Syntax

zoneset name *zoneset-name*

undo zoneset name *zoneset-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

zoneset-name: Specifies the zone set name, a case-sensitive string of 1 to 64 characters. A zone set name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone set **zs1** and enter its view.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zoneset name zs1
[Sysname-vsan1-zoneset-zs1]
```

Related commands

display zoneset

zoneset rename

Use **zoneset rename** to rename a zone set.

Syntax

zoneset rename *old-name new-name*

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

old-name: Specifies the name of the zone set to be renamed, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

new-name: Specifies the new zone set name, a case-sensitive string of 1 to 64 characters. This name can contain English letters (uppercase and lowercase), numbers, and special characters dollar sign ($), minus sign (-), caret (^), and underscore (_), and it must start with an English letter.

Examples

Create zone set **zs1**.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] zoneset name zs1
[Sysname-vsan1-zoneset-zs1] quit
```

Rename zone set **zs1** as **zs2**.

```
[Sysname-vsan1] zoneset rename zs1 zs2
```

Related commands

- **display zoneset**
- **zoneset name**

NPV commands

display npv login

Use **display npv login** to display the nodes on downlink interfaces of an NPV switch and their mapped uplink interfaces.

Syntax

display npv login [**vsan** *vsan-id*] [**interface** *interface-type interface-number*]

display npv login [**vsan** *vsan-id*] **count**

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays information for all VSANs on an NPV switch.

interface *interface-type interface-number*: Specifies a downlink interface by its type and number. If no downlink interface is specified, this command displays information for all downlink interfaces on an NPV switch.

count: Displays the total number of logged-in nodes on an NPV switch.

Usage guidelines

This command is available only when the switch is operating in NPV mode.

Examples

Display the nodes on downlink interfaces and their mapped uplink interfaces on an NPV switch.

```
<Sysname> display npv login
Server                                                          External
Interface VSAN FCID      Port WWN                 Node WWN                  Interface
Vfc1      1    0xae0002  20:00:00:23:89:c9:fc:05  20:00:00:23:89:c9:fc:05  Vfc3
Vfc2      1    0xae0003  10:00:00:00:c9:66:6b:60  20:00:00:00:c9:66:6b:60  Vfc3
```

Display the number of logged-in nodes for VSAN 1.

```
<Sysname> display npv login vsan 1 count
Total entries: 2
```

Display the total number of logged-in nodes for all VSANs.

```
<Sysname> display npv login count
VSAN          Entries
1             2
```

99

```
     2             1

Total entries: 3
```

Table 31 Command output

Field	Description
Server Interface	Name of the downlink interface.
External interface	Name of the uplink interface mapped by the downlink interface.
FCID	FC address of the node.
Port WWN	Port WWN of the node connected to the NPV switch.
Total entries	Total number of logged-in nodes.

display npv status

Use **display npv status** to display the status of the NPV switch.

Syntax

display npv status [**vsan** *vsan-id*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the status of the switch in all VSANs.

Usage guidelines

This command is available only when the switch is operating in NPV mode.

You can use this command to display the status of each interface in VSANs, including VSAN tagging mode, interface state, and FC address.

Examples

Display the status of the NPV switch in VSAN 1.
```
<Sysname> display npv status vsan 1
External Interfaces:
  Interface: Vfc2  VSAN tagging mode: Tagging
    VSAN   State   FCID
    1      Up      0x010002


  Interface: Vfc3  VSAN tagging mode: Non tagging
    VSAN   State   FCID
```

```
     1     Up      0x010001

  Number of External Interfaces: 2


Server Interfaces:
  Interface: Vfc5  VSAN tagging mode: Tagging
    VSAN  State
    1     Down

  Number of Server Interfaces: 1
```

Display the status of the NPV switch in all VSANs.

```
<Sysname> display npv status
External Interfaces:
  Interface: Vfc1  VSAN tagging mode: Non tagging
    VSAN  State  FCID
    2     Up      0x010003


  Interface: Vfc2  VSAN tagging mode: Tagging
    VSAN  State  FCID
    1     Up      0x010002
    2     Up      0x010003(Unavailable)
    5     Down


  Interface: Vfc3  VSAN tagging mode: Non tagging
    VSAN  State  FCID
    1     Up      0x010001

  Number of External Interfaces: 3


Server Interfaces:
  Interface: Vfc4  VSAN tagging mode: Non tagging
    VSAN  State
    2     Up


  Interface: Vfc5  VSAN tagging mode: Tagging
    VSAN  State
    1     Down
    2     Up
    3     Down

  Number of Server Interfaces: 2
```

Table 32 Command output

Field	Description
External Interfaces	List of uplink interfaces.
Server Interfaces	List of downlink interfaces.
Interface	Interface name.

Field	Description
State	State of the interface: Up or Down.
FCID	After an uplink interface goes up, the FC ID allocated by the core switch is displayed. A downlink interface does not have an FC ID.
	If an NPV switch is connected to two fabrics and its two uplink interfaces are assigned the same FC ID in a VSAN, one uplink interface can be up, but it cannot work as an uplink interface. In this case, **Unavailable** in parentheses is displayed after the FCID field.
	NOTE:
	There can be multiple fabrics in an FC SAN. For example, in an FC SAN, if there are two FCF switches that are not interconnected, each FCF switch forms a fabric.

display npv traffic-map

Use **display npv traffic-map** to display the traffic mapping information (downlink-to-uplink interface mappings) of the NPV switch.

Syntax

display npv traffic-map [**vsan** *vsan-id*] [**interface** *interface-type interface-number*]

Views

Any view

Predefined user roles

network-admin

network-operator

mdc-admin

mdc-operator

Parameters

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839. If no VSAN is specified, this command displays the traffic mapping information of all VSANs.

interface *interface-type interface-number*: Specifies a downlink interface by its type and number. If no downlink interface is specified, this command displays the traffic mapping information of all downlink interfaces.

Usage guidelines

This command is available only when the switch is operating in NPV mode.

Examples

Display traffic mapping information.

```
<Sysname> display npv traffic-map
NPV traffic map information of VSAN 1:
  Server interface      External interface
  Vfc1                  Vfc4
```

npv load-balance disruptive

Use **npv load-balance disruptive** to initiate a disruptive load-balancing process on an NPV switch.

Syntax

npv load-balance disruptive

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Usage guidelines

This command is available only when the switch is operating in NPV mode.

If the interfaces in a VSAN are not distributed evenly, you can use this command to initiate a disruptive load-balancing process so that all nodes in the VSAN relog in to the core switch.

This feature redistributes downlink traffic across all uplink interfaces for better load balancing, but it causes traffic interruption.

Examples

Configure the NPV switch to initiate a disruptive load-balancing process in VSAN 1.

```
<Sysname> system-view
[Sysname] vsan 1
[Sysname-vsan1] npv load-balance disruptive
The command may cause traffic interruption. Continue? [Y/N]:y
```

npv traffic-map

Use **npv traffic-map** to configure an uplink-to-downlink interface mapping.

Use **undo npv traffic-map** to remove a configured uplink-to-downlink interface mapping.

Syntax

npv traffic-map server-interface *interface-type* *interface-number* **external-interface** *interface-type* *interface-number*

undo npv traffic-map server-interface *interface-type* *interface-number* **external-interface** *interface-type* *interface-number*

Default

No uplink-to-downlink interface mapping is configured.

Views

VSAN view

Predefined user roles

network-admin

mdc-admin

Parameters

server-interface *interface-type interface-number*: Specifies a downlink interface by its type and number, which can only be a VFC interface.

external-interface *interface-type interface-number*: Specifies an uplink interface by its type and number, which can only be a VFC interface.

Usage guidelines

This command is available only when the switch is operating in NPV mode.

When uplink-to-downlink interface mappings are configured for a downlink interface, the downlink interface can select an uplink interface to map from only the uplink interfaces mapped to the downlink interface. If no uplink-to-downlink interface mapping is configured for the downlink interface, it can select an uplink interface to map from all uplink interfaces in the same VSAN.

Examples

Configure a mapping between VFC 1 (downlink interface) and VFC 2 (uplink interface).

```
<Sysname> system-view
[Sysname] vsan 10
[Sysname-vsan10] npv traffic-map server-interface vfc 1 external-interface vfc 2
```

FC ping commands

fcping

Use **fcping** to verify whether the destination address is reachable and to display the related statistics.

Syntax

fcping [**-c** *count* | **-t** *timeout*] * **fcid** *fcid* **vsan** *vsan-id*

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameters

-c *count*: Specifies the number of echo requests to be sent, in the range of 0 to 2147483647 and defaulting to 5. The value of 0 indicates that echo requests are continuously sent until you manually stop sending them.

-t *timeout*: Specifies the timeout value in seconds of an echo reply. The value range is 1 to 10 and defaults to 5. If the source does not receive an echo reply within the timeout period, it considers the echo reply timed out.

fcid *fcid*: Specifies the destination address. If the destination is a node, the *fcid* argument indicates the FC address of the node. If the destination is an FC switch, the *fcid* argument indicates the domain controller address FFFCxx of the switch, where xx is the domain ID of the destination switch. For example, if the domain ID of the destination switch is 3, its domain controller address is FFFC03.

vsan *vsan-id*: Specifies a VSAN by its ID in the range of 1 to 3839.

Usage guidelines

To abort the FC ping operation during the execution of the command, press **Ctrl+C**.

Examples

Check whether the device with destination address FFFC02 in VSAN 1 is reachable.

```
<Sysname> fcping fcid fffc02 vsan 1
FCPING fcid 0xfffc02: 128 data bytes, press CTRL_C to break.
Reply from 0xfffc02: bytes = 128 time = 1.281 ms
Reply from 0xfffc02: bytes = 128 time = 0.890 ms
Reply from 0xfffc02: bytes = 128 time = 0.889 ms
Reply from 0xfffc02: bytes = 128 time = 0.892 ms
Reply from 0xfffc02: bytes = 128 time = 0.894 ms

--- 0xfffc02 fcping statistics ---
5 packet(s) transmitted
5 packet(s) received
0.00% packet loss
round-trip min/avg/max = 0.889/0.969/1.281 ms
```

FC ping packets fail to be delivered.

```
<Sysname> fcping fcid fffc01 vsan 1
FCPING fcid 0xfffc01: 128 data bytes, press CTRL_C to break.
fcping: sendto: No route to host
fcping: sendto: No route to host
fcping: sendto: ^C
--- 0xfffc01 fcping statistics ---
3 packet(s) transmitted
0 packet(s) received
100.00% packet loss
```

Table 33 Command output

Field	Description
FCPING fcid 0xfffc02	Check whether the device with destination address FFFC02 is reachable.
128 data bytes	Number of data bytes in each echo request.
press CTRL_C to break	During the execution of the command, press **Ctrl+C** to abort the FC ping operation.
Reply from 0xfffc02: bytes = 128 time = 0.892 ms	Received the echo reply from the device whose destination address is 0xfffc02. • **bytes**—Number of data bytes in the echo reply. • **time**—Response time.
Request time out	No echo reply was received within the timeout period.
fcping: sendto: No route to host	Echo request failed to be delivered.
-- 0xfffc02 fcping statistics --	Statistics on the data received and sent in the FC ping operation.
5 packet(s) transmitted	Number of echo requests sent.
5 packet(s) received	Number of echo replies received.
0.00% packet loss	Percentage of packets not responded to the total number of packets sent.
round-trip min/avg/max = 0.889/0.969/1.281 ms	Minimum/average/maximum response time, in milliseconds.

FC tracert commands

fctracert

Use **fctracert** to detect bidirectional routing information between source and destination. The destination can be a node or FC switch.

Syntax

fctracert [**-t** *timeout*] **fcid** *fcid* **vsan** *vsan-id*

Views

Any view

Predefined user roles

network-admin

mdc-admin

Parameters

-t *timeout*: Specifies the timeout value in seconds for the entire FC tracert process. The value range is 1 to 10 and defaults to 5.

fcid *fcid*: Specifies the destination address. If the destination is a node, the *fcid* argument indicates the FC address of the node. If the destination is an FC switch, the *fcid* argument indicates the domain controller address FFFCxx of the switch, where xx is the domain ID of the destination switch. For example, if the domain ID of the destination switch is 3, its domain controller address is FFFC03.

vsan *vsan-id*: Specifies an existing VSAN by its ID in the range of 1 to 3839.

Usage guidelines

The bidirectional routing information includes WWNs and domain controller addresses of all switches on a round trip. The device supports a maximum of 255 hops for a round trip.

To abort the FC tracert operation during the execution of the command, press **Ctrl+C**.

Examples

Detect bidirectional routing information between source and destination (a node with FC address 0xd70000) in VSAN 1.

```
<Sysname> fctracert fcid d70000 vsan 1
Route present for: 0xd70000, press CTRL_C to break.
20:00:00:0b:46:00:02:82(0xfffcd5)
20:00:00:05:30:00:18:db(0xfffcd7)
20:00:00:05:30:00:18:db(0xfffcd7)
20:00:00:0b:46:00:02:82(0xfffcd5)
Fctracert completed.
```

Table 34 Command output

Field	Description
Route present for	Path from source to destination.

Field	Description
press CTRL_C to break	During the execution of the command, press **Ctrl+C** to abort the FC tracert operation.
20:00:00:0b:46:00:02:82	WWN value.
0xfffcd5	Domain controller address FFFCxx of the switch, where xx is the domain ID of the switch.
Fctracert uncompleted.	The FC tracert operation fails to be completed for the following possible reasons: • Resource is not enough. • Max hops reached. • Fabric is being built. • No route to destination port. • Destination port is not in fabric. • Destination port and source port are not in the same zone.
Service is unavailable.	The FC tracert service is not started, or internal processing fails.

Support and other resources

Contacting HP

For worldwide technical support information, see the HP support website:

http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

http://www.hp.com/go/wwalerts

After registering, you will receive email notification of product enhancements, new driver versions, firmware updates, and other product resources.

Related information

Documents

To find related documents, browse to the Manuals page of the HP Business Support Center website:

http://www.hp.com/support/manuals

- For related documentation, navigate to the Networking section, and select a networking category.
- For a complete list of acronyms and their definitions, see *HP FlexNetwork Technology Acronyms.*

Websites

- HP.com http://www.hp.com
- HP Networking http://www.hp.com/go/networking
- HP manuals http://www.hp.com/support/manuals
- HP download drivers and software http://www.hp.com/support/downloads
- HP software depot http://www.software.hp.com
- HP Education http://www.hp.com/learn

Conventions

This section describes the conventions used in this documentation set.

Command conventions

Convention	Description
Boldface	**Bold** text represents commands and keywords that you enter literally as shown.
Italic	*Italic* text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x | y | … }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x | y | …]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x | y | … } *	Asterisk-marked braces enclose a set of required syntax choices separated by vertical bars, from which you select at least one.
[x | y | …] *	Asterisk-marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

GUI conventions

Convention	Description
Boldface	Window names, button names, field names, and menu items are in bold text. For example, the **New User** window appears; click **OK**.
>	Multi-level menus are separated by angle brackets. For example, **File** > **Create** > **Folder**.

Symbols

Convention	Description
⚠ WARNING	An alert that calls attention to important information that if not understood or followed can result in personal injury.
△ CAUTION	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
⊘ IMPORTANT	An alert that calls attention to essential information.
NOTE	An alert that contains additional or supplementary information.
💡 TIP	An alert that provides helpful information.

Network topology icons

	Represents a generic network device, such as a router, switch, or firewall.
	Represents a routing-capable device, such as a router or Layer 3 switch.
	Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features.
	Represents an access controller, a unified wired-WLAN module, or the switching engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a security product, such as a firewall, a UTM, or a load-balancing or security card that is installed in a device.
	Represents a security card, such as a firewall card, a load-balancing card, or a NetStream card.

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.

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